

FLIGHT

The
AIRCRAFT ENGINEER
AND AIRSHIPS

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EDITORIAL COMMENT



MEMBERS of the Royal United Service Institution were much impressed when Wing Com. Orlebar read a paper to them on "High Speed Flying" on March 23. The statement that an aeroplane can be flown "hands off" at 330 m.p.h. especially astonished them. The sensation-loving Press has delighted to paint pictures of intrepid birdmen battling with death as they grimly held a hurtling bullet on its course, gasping for breath in the exhaust fumes, wrestling with the controls, sinking into unconsciousness at each turn, facing the risk of diving into the sea before they could recover control, and thinking longingly of the glass of milk which would revive them at the end of their course. Orlebar's picture of the ease and fascination of flying at high speed rudely upset this lurid picture. The take-off, it is admitted, is rather "peculiar," but once the machine is in the air it gives the pilot a perfect joy-ride, and he soon comes to think of anything under 300 m.p.h. as absolutely slow. Perhaps even more striking was the statement that in the take-off the floats have to travel at the speed of the world's record motor boat. Obviously there is nothing much of the superman about the high-speed pilots when they are in the air; but when they are on the water, they, and Mr. Kaye Don, are very much to be admired.

Wing Com. Orlebar is very good at making the punishment fit the crime. He has great judgment in selecting what is fitting to each occasion. Probably that was one reason why he made such a successful C.O. of the High Speed Flight. Speaking to the Royal United Service Institution, he wisely avoided the technicalities which would have been fitting if his audience had been the Royal Aeronautical Society. On the other hand he also avoided the sensational, the frivolous, and the statistical treatment. In his own words, he did not reckon how many cups of tea could have been boiled by the heat generated by the engines. After describing the main features of high-speed flying, he turned to a consideration of its utility. The cost had been

DIARY OF CURRENT AND FORTHCOMING EVENTS

Club Secretaries and others desirous of announcing the dates of important fixtures are invited to send particulars for inclusion in this list:—

- 1932
- Apr. 1. Entries close at ordinary fees for King's Cup Race.
 - Apr. 1. Opening of Greek Aero Show, Athens.
 - Apr. 2. Rugby: Army v. R.A.F., at Twickenham.
 - Apr. 2-10. National Aircraft Show, Detroit, U.S.A.
 - Apr. 3. Northamptonshire Ae.C. Air Display.
 - Apr. 7. "Wing Construction," Lecture by H. J. Stieger, before R.Ae.S.
 - Apr. 7-8. Imperial Services Boxing Championships.
 - Apr. 16. W.R.A.F. Reunion Dinner at Criterion Restaurant.
 - Apr. 16. T.M.A.C. Dance at Suffolk Galleries, Suffolk St., S.W.1.
 - Apr. 13. "The North-West Frontier of India," Lecture by Maj.-Gen. S. F. Muspratt, before R.U.S.I.
 - Apr. 14. "Aero Engine Accessories," Lecture by W. L. Taylor, before R.Ae.S.
 - Apr. 21. "Air Port Development," Lecture by N. Norman, before R.Ae.S.
 - Apr. 23. No. 45 Sqdn. R.A.F. Reunion Dinner at Crown and Cushion Restaurant, London Wall.
 - May 1. Northamptonshire Ae.C. Combined Motor-cycling and Flying Display.
 - May 1. Entries close at double fees for King's Cup Race.
 - May 7. Heston Spring Cruise begins.
 - May 7. Antwerp Aviation Club Air Display and Garden Party.
 - May 14. Coventry Ae.C. Air Pageant.
 - May 14-15. Skegness Air Pageant.
 - May 16. Northamptonshire Ae.C. Annual Pageant.
 - May 18. Household Brigade Flying Club Meeting, Heston.
 - May 21. "Morning Post" Cross-Country Air Race, Heston.
 - May 21-23. Scottish Flying Club Display, Moorpark, Renfrew.
 - May 22. Husbands Bosworth Flying Meeting.
 - May 22-30. Conference of Transoceanic Aviators at Rome.
 - May 28. London-Newcastle Air Race for "Newcastle Evening World" Trophy.
 - May 28. Brooklands Meeting.
 - June 4. Bristol Airport Summer Flying Meeting.
 - June 4. Cardiff Flying Meeting.
 - June 4. Leicester Ae.C. Flying Display and Motor Gymkhana at Ratcliffe Aerodrome.
 - June 5. Reading Ae.C. At Home, Woodley Aerodrome.
 - June 11. Leicester Ae.C. Meeting, Desford.
 - June 18. Hull Air Display.

high, in money and in lives; had the result been worth the cost? Using the comparative method of argument, he questioned whether the cost had really been high. All progress was costly, but much progress was accomplished in privacy where special correspondents do not poke in their noses. One polar expedition was mentioned, the cost of which was two and a half times the cost of the British effort in winning the Schneider Trophy. Wing Com. Orlebar did not depreciate exploration, but he submitted that the results of high-speed flying were quite as valuable. We too do not depreciate exploration. All effort which adds to the sum of human knowledge is to be approved; but we do believe that the lessons learnt by the research and experiment in high-speed flying which has been stimulated by the Schneider contests, and which could not otherwise have been stimulated, will have a more direct beneficial effect on human progress than some forms of exploration can have.

Speaking to a Service audience, Wing Com. Orlebar gave one practical illustration of how the lessons learnt by the High Speed Flight might be put to practical advantage in war. Fighter aeroplanes, when diving at bombers, frequently carry out the manoeuvre of diving underneath, and then zooming up to fire at the blind spot under the bomber's tail. With the speed of modern fighters when on the dive, it might happen that the fighter pilots would experience "blacking out" at the critical moment of the turn and zoom. The High Speed Flight has learnt that a gentler turn loses less speed and does not cause blacking out. It would also mean that while turning, and unable to fire at the bombers, the fighters, through using the gentler turn, would be at longer range from the bombers' rear guns.

Wing Com. Orlebar also mentioned the possible effect of this research on commercial flying. The average speed of aircraft has increased, largely as a result of the Schneider effort. By continuing to work on present lines, 400 m.p.h. may become a normal speed for a civil machine carrying a pay load. People may say that they do not want to fly at that speed (and we confess that the thought of the take-off does not sound very alluring to sober citizens who had had to work long years in offices before they could afford the fare), but Orlebar pointed out that human nature is very adaptable. It was once thought that a motorist would not be able to stand a speed of 60 m.p.h. Pilots soon get to think of anything under 300 m.p.h. as slow; and after all, once one is in the air, there is very little sensation of speed even at 400 m.p.h. In any case mails will raise no objection to any possible discomforts attendant on hurry, and it is mails chiefly which need high speed in commercial aircraft.



Long flights may be divided into three categories, useful flights which teach some lesson, harmless stunts, and pernicious stunts. The first record made in any given class of aeroplane between two points

**Two More
Records
Broken**

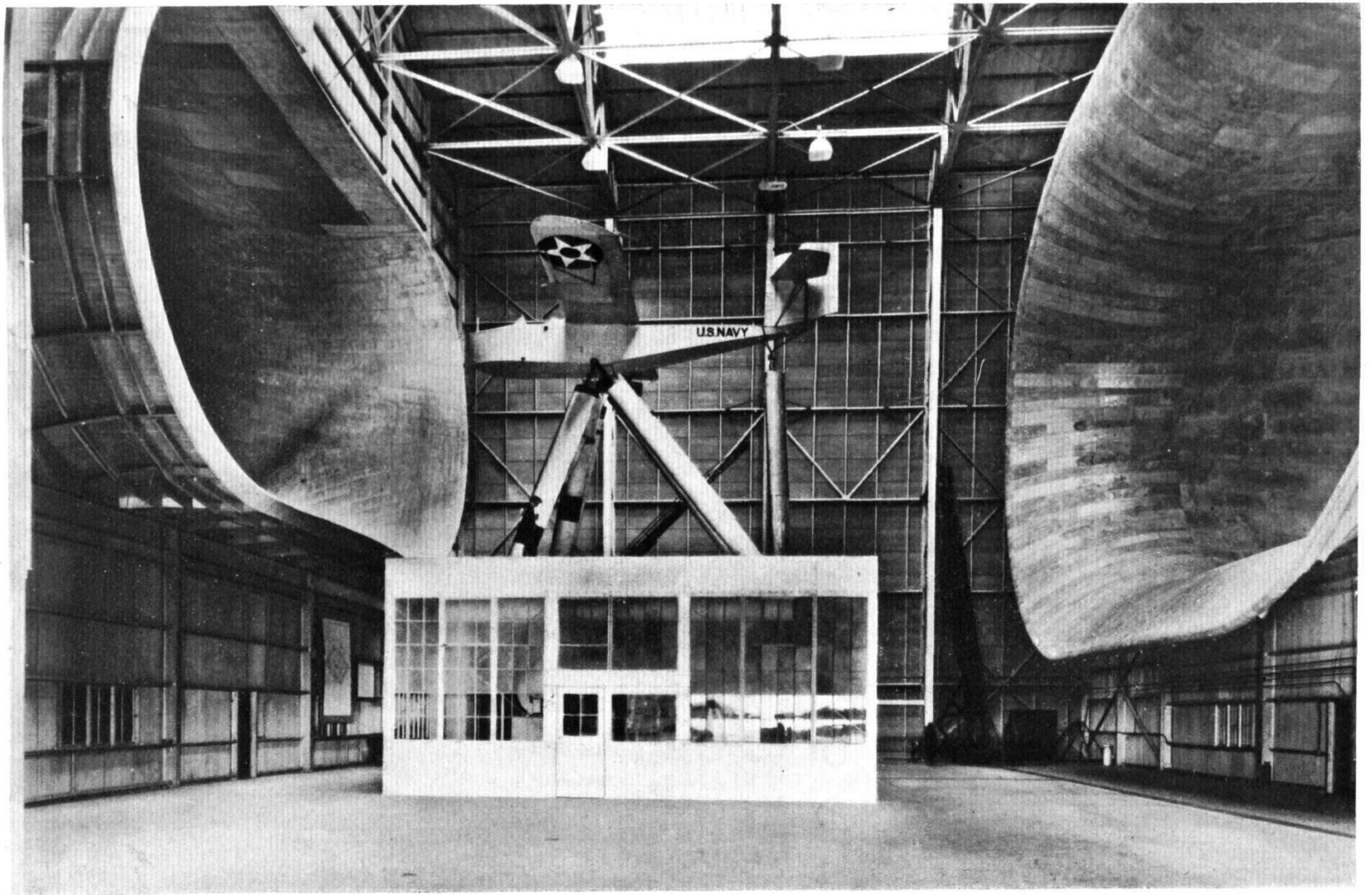
usually comes into the first category. Subsequent attempts to lower that record usually fall into the second. Flights in which the risk run is greater than any advantage which can come from success must go into the third class. Hinkler's first flight to Australia in a light aeroplane was about the best

instance of the first class of flight. Hinkler's crossing of the South Atlantic in a small landplane, however praiseworthy as a performance, comes within the third, together with all trans-oceanic flights in single-engined landplanes. Mollison's record dash to Capetown is an excellent example of the second class of flight. He ran a good deal of risk, but not what we call undue risk. That is to say, he was not sure to be drowned immediately if his engine failed. The flight also was a further proof of the reliability of modern aircraft and engines, more especially of the small class in which Great Britain stands supreme. Still, a further proof is not the same thing as an original proof. We do not actually hold a higher opinion of the "Puss Moth" and the inverted Gipsy engine than we held last week. The utility of the flight and the dangers of the flight are neither of them of the highest importance. We regard this flight as a purely sporting affair, in which Mr. Mollison matched his endurance against the clock, and won.

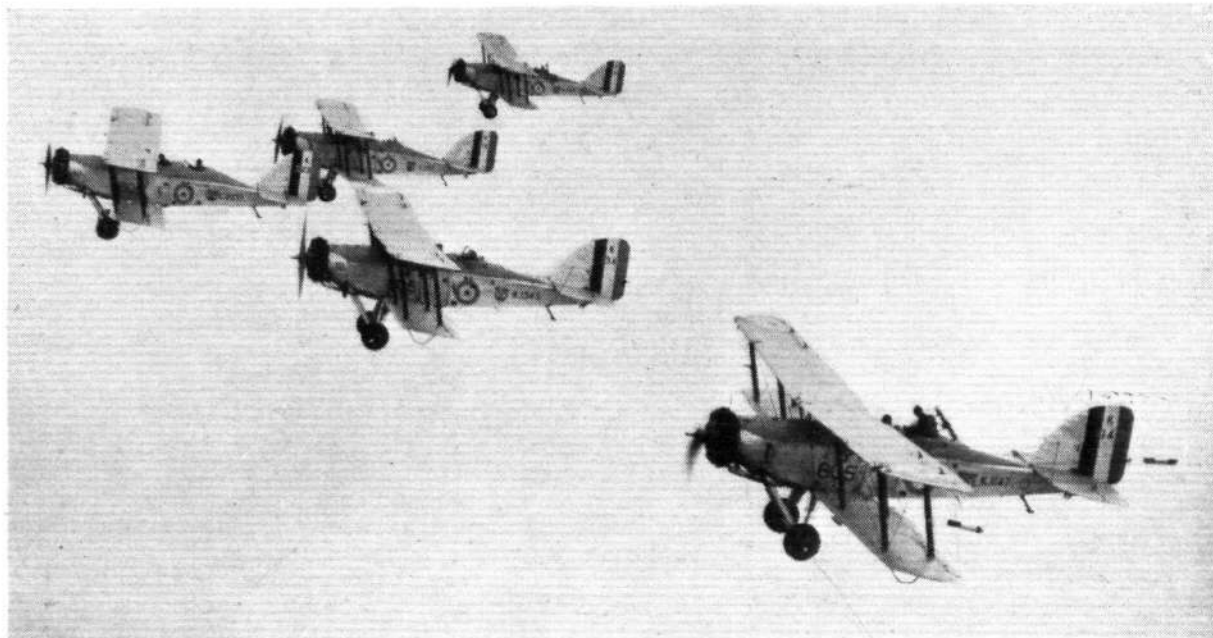
Members of any decent crew in a boat race row themselves out completely in a race, and do it again and again. Sportsmen who do not row consider this to be a very dull form of amusement, and cannot understand the attraction which it has for the wet-bob. Mr. Mollison evidently takes just the same sort of delight in flying day after day and night after night until he sees his instruments double, is thrown into a frenzy of fear by the lights on an aerodrome, and crashes on a beach rather than have to face the horror. His frame of mind must be very like that of the rowing man. The desire to test the endurance of the human frame to the uttermost is common to them both. We have a very great admiration for men who will display such manly grit, whether the object for which they undergo the ordeal advances any particular cause or not. We rejoice that the British race still produces men like Mollison. He is a sporting hero, and we offer him our unfeigned congratulations.

Quite a different sort of record has been broken by the two French pilots Bossoutrot and Rossi. They have spent 76 hours 35 minutes in a Blériot monoplane with a 600-h.p. Hispano-Suiza engine, during which they covered 10,605 kilometres (6,595 miles) in a closed circuit. This feat also called for very great endurance, but in this case it is the technical, rather than the human, element which arouses our admiration. That an aeroplane should be able to cover so prodigious a distance is a most remarkable testimony to the skill of the designers of aircraft, engine, and such things as carburetter. Records when the machine is refuelled in the air do not rouse our enthusiasm, but a record without refuelling is a very great feat.

Supposing that Gayford and Bett, in the Fairey (Napier) monoplane, succeed in flying non-stop to Capetown next autumn, we shall undoubtedly feel very exhilarated at such a British feat. We certainly do set more store by a flight between two points than by a flight in a closed circuit; but the two are not comparable. A record in each class is well worth while, for each teaches lessons of its own, and each in its own way marks an advance in making the aeroplane a more useful servant of man. We congratulate the French nation on the very fine feat performed by its designers and its pilots.



FULL SCALE RESEARCH: This photograph of the new large wind tunnel at Langley Field, Virginia, has been very kindly lent to us by Mr. John J. Ide, Technical Assistant in Europe of the American N.A.C.A. The tunnel is of the open type, and the aeroplane is supported on a six-component balance by means of struts in the centre of an airstream 60 ft. wide and 30 ft. high. The four-bladed propellers which circulate the air are of 35½ ft. diameter, and each is driven by an electric motor of 4,000 h.p. The airstream velocity reaches the high figure of 112 m.p.h. The machine under test is a Loening flying boat.



(FLIGHT Photo.)

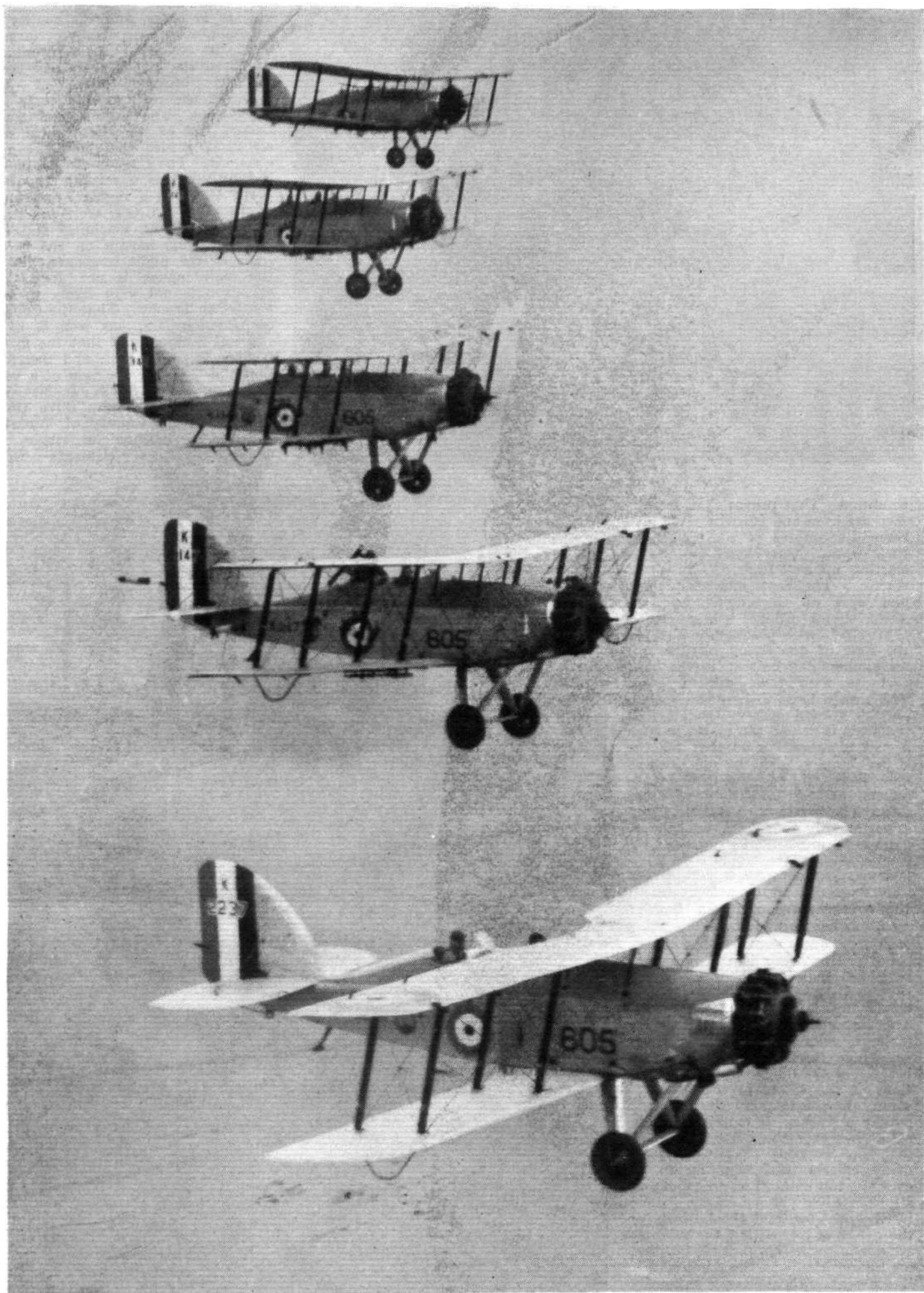
No. 605 County of Warwick Bomber Squadron

IN a recent issue we reported how the County of Warwick Bomber Squadron has won the Esher Trophy three times, and in the last two years successively. This achievement attracted the attention of the Prince of Wales, who consented himself to present the trophy to the squadron on the occasion of his recent visit to Birmingham. It had been our intention on that occasion to publish some photographs of the squadron at work, in the air and on the ground, but the weather at Birmingham at the time put photography out of the question. A subsequent visit by our photographer was

also greeted by a fog such as always seems to envelop that great Midland city whenever any representatives of FLIGHT venture to enter it. Presumably the County of Warwick pilots have now become experts at flying in formation through fog, and keeping very accurate formation, too. Their skill in this respect helps us to understand one of the reasons why they so frequently annex the Esher Trophy. So far as our experience goes, if they could not fly through fog they would not be able to fly at all, and there would be no reason for maintaining a squadron of the Auxiliary Air Force in the neighbourhood



A group of officers of No. 605 B.S. : Names left to right—P/O. W. C. Barnaby ; F/O. H. Seidenberg ; F/O. J. P. Huins ; Flt. Lt. G. V. Perry ; Sqd. Ldr. J. A. C. Wright, A.F.C., T.D., Commanding Officer ; Flt. Lt. S. D. Macdonald, D.F.C., Adjutant ; F/O. M. V. de Satge, Asst. Adjutant ; P/O. G. Wright ; F/O. J. M. Abell ; F/O. B. P. A. Vallance. (FLIGHT Photo.)



(FLIGHT Photo.)

of Birmingham at all. At any rate, our photographs show a composite flight of five "Wapitis" in Squadron V and in echelon on the left, stepped up, and they show how well the Auxiliary pilots can keep station. Echelon, stepped up, is not by any means the easiest formation for

pilots to keep, and the County of Warwick men carried it through very well indeed.

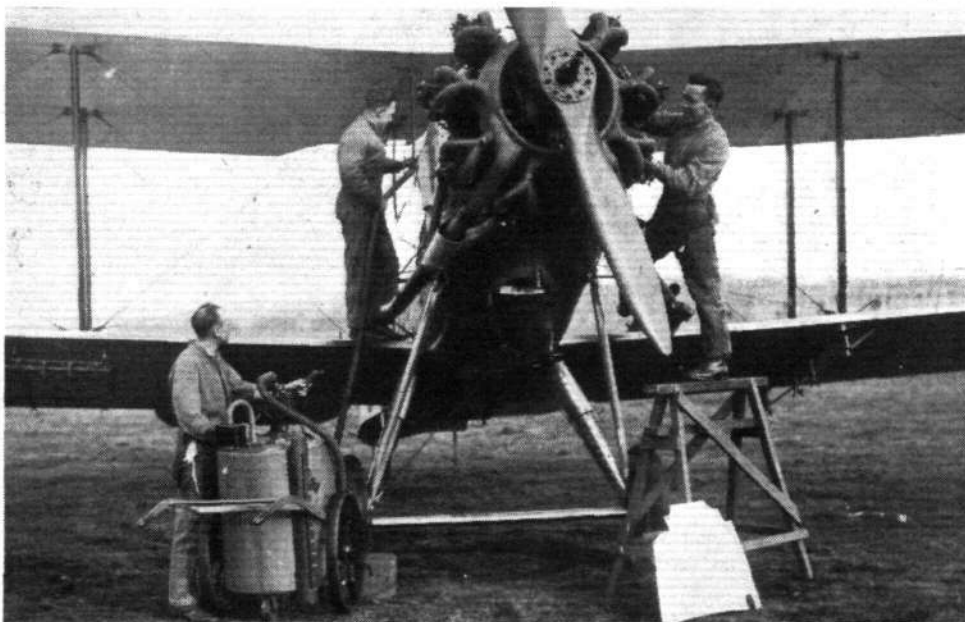
A good squadron does not live by good pilots alone. The airmen must be good, too. The "Wapitis" and "Jupiters" of No. 605 B.S. are kept in excellent



condition. That proves that the airmen are keen and efficient. We give three illustrations of the airmen at their work. One shows an airman starting up a "Jupiter" by a gas starter. The next shows refuelling and work on the engine, and the third shows airmen loading up a "Wapiti" with practice bombs. In the first of our flying pictures the air gunners can be seen in the back cockpits with their camera guns. The airmen have to be equally good on the ground and in the air if a squadron is to win top marks in such a keen competition as that for the Esher Trophy. In the air the airmen have to be gunners, bomb-aimers, and do a variety of other jobs. The bombing of this squadron is particularly good, and, we believe, gained it most marks in the last competition for the trophy. In wireless and photography it is also extremely proficient, as well as in all the others plays which a bomber squadron has to undertake.

Kipling once wrote "The backbone of the Army is the non-commissioned man." There are many who hold that the great war was won by saying "Carry on, Sergeant." The importance of the N.C.O. is, perhaps, even greater in the Royal Air Force than it is in the Army, because of the difference in the functions of the officer in the two services. In the infantry the officer is mainly a leader. It matters little in action whether the officer is expert with his weapons or not—in fact, many officers used regularly to go over the top without any weapons at all. The killing of the enemy is done by the privates, and the business of the officer is to see that the privates are put into the best possible position for killing him. In the Air Force it is different. The officer is primarily a flying man. His worth is judged mainly by his ability and conduct when in the air. He may be a splendid pilot, but an indifferent commander of men. The other ranks, though they have to provide rear gunners, are in the main craftsmen who keep the machines and

engines in order, and the quality of the maintenance depends very largely upon the N.C.O's. In an Auxiliary squadron the matter is further complicated because some of the N.C.O's. are regulars and some are Auxiliaries. The same is true of the officers and of the aircraftmen. In all three grades there are the two elements. The C.O. is an Auxiliary, the Adjutant is a regular, the Sergeant Major is a regular, and most of the other N.C.O's. are Auxiliaries. The care of the machines and engines depends mostly on the excellence of the flight sergeants, and if the maintenance is not good, the squadron is not very likely to win the Esher Trophy. That the County of Warwick B.S. has won it three times is a sure proof that the maintenance is of the best, and therefore that the N.C.O's. are men of a very high standard of merit. In fact, the winning of this trophy three times shows that the County of Warwick B.S. is a harmonious whole, in which all six elements work



(FLIGHT Photos.)



together as parts of one well-oiled machine. If any one element were wanting, the whole would fail when searching tests have to be encountered. The pivotal men must be the C.O., the Adjutant, and the Sergeant Major. Sqd. Ldr. J. A. C. Wright, A.F.C., T.D., has commanded the squadron since July, 1926, and under him it has won the Esher Trophy three times, in 1927, 1930, and 1931. He has won the Territorial Officers' Decoration, which tells of a long period of unpaid service for his country. The Air Force Cross is a decoration not often won by an officer who is not a regular. The County of Warwick Squadron is obviously very heartily to be congratulated on having been commanded by such an officer.

Flt. Lt. S. D. Macdonald has been Adjutant since August, 1929. To be a regular working under the command of a citizen airman is always a position which calls for much tact as well as ability. Unless the two work together in the greatest harmony there is not much chance of the squadron achieving real excellence, and again this squadron may be accounted fortunate. It is not easy for an outsider to appraise accurately the work of a Sergeant Major, though, again, the success of the squadron is a testimony to his merit. At least we can testify that the S.M. of this squadron turned out a very smart Guard of Honour to greet the Prince of Wales.

F. A. DE V. R.



(FLIGHT Photos.)



(FLIGHT Photo.)

England—Cape Town in 4½ Days

Mollison Realises his Ambition

GRADUALLY the aeroplane is bringing the parts of the British Empire closer together, mentally no less than physically. By his flight Mr. J. A. Mollison has brought Capetown within 4 days 17 hr. 19 min. of London, and, although this was achieved at the cost of terrific strain on the pilot, the flight has once again demonstrated to the world the qualities of

British aircraft and British aero engines. No one would argue from Mollison's flight that Imperial Airways could and should operate to a similar time schedule with the mails. This is not yet possible, but the outstanding flight of to-day is the everyday occurrence of to-morrow, and by his flight Mollison has, among other things, given us a glimpse of the not too distant future when a letter posted in London to-day will be delivered in Capetown some five days later.

The history of Mollison's flight is one of heroic struggle by man against nature's limitations. Anyone who has made a flight of even a few hours' duration will know the almost irresistible tendency to sleep which the drone of the engine induces. How Mollison managed to remain awake with so little sleep is in itself a wonder. That he was able to navigate as accurately as he must have done to cover the distance in the time is little short of marvellous.

Leaving Lympne Aerodrome, Kent, on Thursday last, March 24, at 1.05 a.m., in his "Puss Moth" G-ABKG (Gipsy III engine), he crossed France during the earlier part of that day and the Mediterranean during the late morning, landing at Oran, in Northern Africa, at 12.30 p.m. After half-an-hour's halt for refuelling he was off again and reached Colomb Bechar at 4.30 in the afternoon.

After a short rest at Colomb

Bechar Mollison set off again to cross the Sahara desert by night. Reggan Oasis was reached at 8.40 a.m. on Friday, March 25. Less than an hour later he was on his way once more, with Gao as his destination. He does not, however, appear to have landed at Gao, but was reported as having passed over in the evening. On Saturday, March 26, he landed at Niamey at 6 p.m. It was afterwards stated that Mollison had had some slight trouble, and that he had made a precautionary landing (as distinct from a forced landing) somewhere between Gao and Niamey.

From Niamey to Walvis Bay Mollison's movements are at the moment a little vague. He flew from Niamey to Duala, thence to Loanda, where he landed at 5.40 p.m. on Sunday, March 27, and left again at 10 p.m. Walvis Bay was reached at 10.45 a.m. on Monday, March 28, and after refuelling the journey was continued. On his way to Capetown Mollison was reported to have been seen over Port Nolloth at 4.30 p.m., and at 8.35 p.m. he landed in the dark on the beach at Milerton, some three miles from Capetown. The aerodrome at Capetown was illuminated in readiness for his arrival, but Mollison was so fatigued from his flight that he felt he could not land his machine safely in the brilliant light, and preferred to take a chance in landing in the dark outside. The machine was somewhat severely damaged, but Mollison himself was unhurt, although naturally utterly exhausted. He was given a great reception in Capetown, and among those to greet him was Miss Amy Johnson.

Details are at present too meagre for a complete log to be given, but in outline the flight took place as shown overleaf.



THE WESTERN ROUTE TO CAPETOWN: By taking this, Mollison saved a distance of nearly 800 miles. His route is very nearly the same as that planned for the Fairey Long-distance monoplane, and is shown in full lines, while Imperial Airways' route is shown dotted.

The log of the flight is as follows:—

Mar. 24	Lympne, dep. 1.05 a.m.	miles.
" "	Oran	1,100
" "	Colomb Bechar	350
" 25	Reggan	375
" 26	Niamey	935
" 26-27	Duala	900
" 27	Loanda	950
" 28	Walvis Bay	945
" "	Cape Town, arr. 8.35 p.m.	800
		6,355

Mr. J. A. Mollison will already be well known to readers of FLIGHT for some of his previous flights, among which the flight from Wyndham, Australia, to Pevensy Beach, Sussex, in 8 days 19 hr. 25 min. is still unbeaten. On that occasion he was using a de Havilland "Gipsy Moth."

By selecting the western route Mollison saved a distance of close on 800 miles as compared with the route followed by the Imperial Airways machines, which goes via Egypt, Sudan, Kenya, Tanganyika, and Rhodesia. The price to be paid for the shorter distance was the long flight across the featureless Sahara desert, and the headwinds to be expected over certain sections of the route.

The flight across the Sahara by night must have been a trying piece of work, and it speaks well of Mollison's ability as a navigator that he succeeded so well. In this he was doubtless aided and abetted by Smith's instruments

and by the Hughes compass with which the machine was equipped. One has come to expect this equipment on machines making noteworthy flights.

So far as can be gathered at the moment, Mollison's flight was without mechanical trouble of any kind. The Gipsy III engine kept running, although it was never far short of maximum revs. the whole way. We have not worked out how many sparks the K.L.G. plugs, fed by B.T.H. magnetos, made during the flight, but it must have been quite a few, and, as usual, there was no cause for complaint.

"Pleased reliable quality Shell petrol. Also splendid refuelling service Shell all points, no matter how remote. This contributed largely my successful flight. Mollison" was the cable received by Shell Mex, and this spirit and Wakefield Castrol once again proved a useful combination. The wide range of climatic conditions, from the March cold at Lympne to the tropical heat of equatorial Africa, were well met by the Titanine doping scheme used on the "Puss Moth" and by the Fairey metal airscrew with which the engine was fitted. These airscrews now appear to be the general choice for flights which have to contend with extremes of climate.

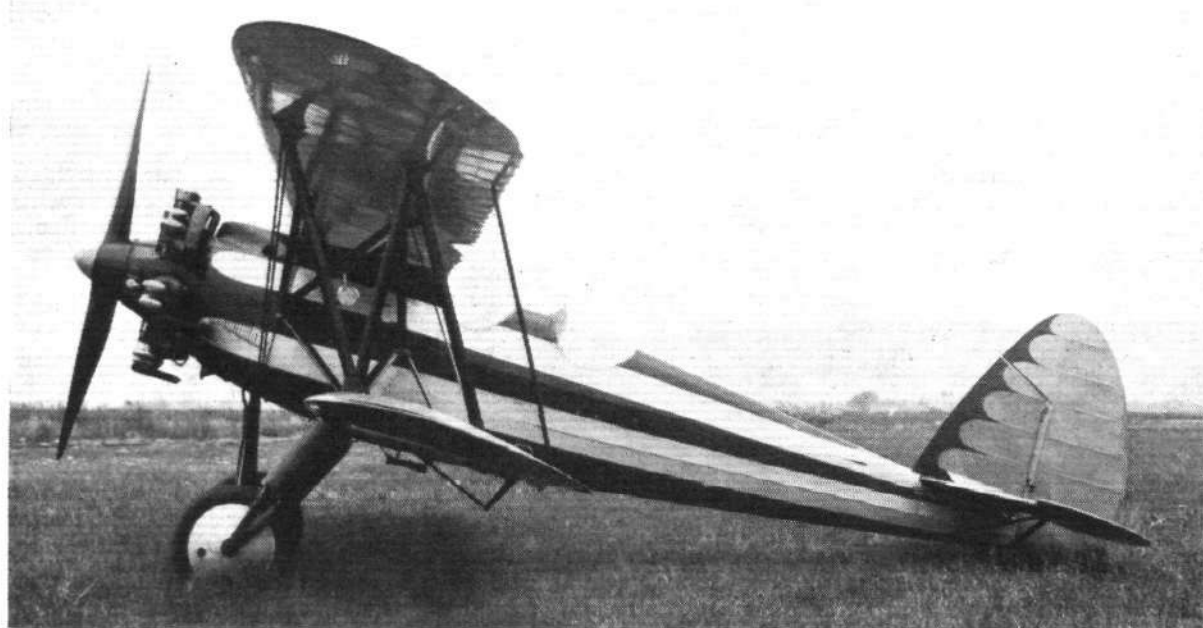
The de Havilland Aircraft Co., Ltd., have received from Mr. Mollison the following telegram:—

"Machine carrying great overload and engine running nearly maximum revolutions performed magnificently."



The Caproni CA.113

An Italian Aerobatic Biplane with 240-h.p. Walter Engine



FOR AEROBATICS: The Caproni CA.113, which is fitted with a 240-h.p. Walter air-cooled radial engine.

THE Caproni "CA.113" is a two-seater dual-control biplane designed for high "aerobatic" performance. It is of mixed wood and metal construction—wood and steel tubing being employed for the fuselage, tail planes and landing gear. The main planes are of equal span, the top plane being staggered forward in order to provide, as much as possible, uninterrupted visibility.

The construction of the wings is of normal type, and two-bay bracing is employed, with streamline steel N interplane struts and streamlined wire bracing. Interconnected ailerons are fitted to all four wings. Fabric, doped with Emallite, is used for covering the wings.

In section the fuselage is rectangular, with a deep turtle deck top of duralumin sheet—the sides and bottom being fabric covered. There are two cockpits, arranged in tandem back of the wings, each equipped with Salvador back-cushion parachutes. All the necessary instruments are fitted in the rear cockpit.

The 240-h.p. Walter air-cooled radial engine is carried in a steel-tube mounting, secured to the fuselage by five

bolts. It is fitted with a Walter carburettor specially designed for aerobatic flying, fed directly by an oscillating piston pump. The fuel and oil tanks are mounted in the fuselage, in front of the forward cockpit. A Maliverti compressed-air starter is fitted.

The tail plane, which is of steel tubing fabric-covered, is adjustable as to incidence during flight. Elevators and rudder are balanced, the rudder and fin being constructed of three-ply wood.

A non-axle undercarriage is fitted, with steel spring and oleo-pneumatic shock absorbers. The wheels are provided with brakes.

The principal characteristics of the CA.113 are:—Span, 34 ft. 5 in. (10.49 m.); O.A. length, 24 ft. 5 in. (7.46 m.); height, 9 ft. 2 in. (2.80 m.); wing area, 276.5 sq. ft. (25.70 m²); weight empty, 1,797 lb. (815 kg.); useful load, 551.25 lb. (250 kg.); maximum speed, 143 m.p.h. (230 k.p.h.); climb to 13,000 ft. (4,000 m.), 15 min.

Mario De Bernardi—the former Schneider Trophy winner, flew one of these machines in the International Air Meeting at Cleveland last year.

C. R.

PRIVATE FLYING & GLIDING

THE LONDON GLIDING CLUB

As an example of amazing enthusiasm the Easter Camp of the London Gliding Club was absolutely supreme.

Until Monday afternoon it was quite impossible to do any flying at all, for everything was wrong. The wind was in the wrong direction, it rained "cats and dogs" almost the whole time, and it was bitterly cold—not for nothing is their site locally known as "Siberia." Not one of these factors, however, disturbed the 60 odd persons who were, in most cases, freezing under canvas during each night. Throughout each day they all found themselves jobs repairing the hangars, putting up fences, repairing the gliders, levelling the ground around the club house or any of hundreds of similar jobs which can always be found if desired. The evenings offered opportunities for the more technically minded to exercise their bent in this direction, and groups were formed to design super sailplanes. A visit to this club at a time like this, by members of an ordinary flying club would be a revelation, for the standard of the technical conversation is very high. This is all to the good, for the more the members know about the "how and why" of their aircraft the better.

The management of the London Gliding Club has been most successfully carried out on far-sighted principles. All the money they have obtained from subscriptions—donations or other forms of subsidy have been conspicuous by their absence—has as far as possible been put into buildings and general improvement of the site. Materials have always been bought in the most advantageous manner and all the work of designing and erecting the buildings has been done by the members themselves. They have now got three large hangars—one of which houses their private owners' machines—and a club house which would put many of the conventional flying clubs to shame.

The worst thing about gliding is the dependence of its devotees upon the wind direction. The site at Totternhoe, which is part of the Dunstable Downs, is admirable as a gliding site, but its usefulness is limited to a westerly wind direction, therefore the success of a week-end camp like this one is entirely dependent on the leniency of the "weather controller." Several members were able to obtain flights on Saturday afternoon as one of the B.A.C. VII two-seaters was in attendance, and this was taken down to a large flat field the other side of Dunstable where the area available was unrestricted, with the

result that any wind direction could be used. During this afternoon Mr. Nyborg, a Danish engineer who has been building gliders since 1903, made an attempt to get his latest machine into the air. This he tried to do by auto-towing, but was unsuccessful owing to the impossibility of keeping the machine from yawing while being towed. He is now probably going to replace the existing skid with a small-wheeled undercarriage before making further attempts. The sailplane itself is unique and embodies many extremely interesting features; Mr. Nyborg has made a life study of the flight of birds and evolved a system of analysis of their performance which shows remarkably consistent results, even when applied to existing sailplanes. It is too early to talk about the performance of this latest machine, but if it comes anywhere near the predicted performance it should cause radical alterations to be made in future sailplane designs. Seen for the first time the machine is very unconventional, for its designer relies largely on a very high aspect ratio with a span loading many times higher than that generally used, but it must be admitted that when erected it certainly looks fairly well proportioned.

Monday afternoon, as already stated, was the first occasion during the week-end when any gliding was possible on the Club site. The wind was still bad, for it was blowing nearly straight along the hill, and was, moreover, very strong and gusty. Mr. Buxton was launched off the hill in the "Professor," well up on a slope which faced more or less south, and was able to reach the "bowl" at the northern end of the range; he was able to gain some height and managed to remain in the air for 20 min. before making a perfect landing at the foot of the hill. Several other members were launched off a small slope at the bottom of the Downs in the "Dagling," "Dickson," and "Hols-der-Teufel," but before many launches had been made it was decided that the gusts made flights rather risky, and in order to avoid breaking the gliders they were returned to the hangar.

Ingenuity is another of the attributes of this club. On looking round, one sees a litter of old cars, which at first looks like complete wrecks; closer inspection, however, reveals the fact that each has its particular use. A "Trojan" (we should like to think that this was the honourable resting place of the "Trojan" which one of our own staff used for many years!) has been converted to



THOSE RESPONSIBLE! Members of the London Gliding Club responsible for the welfare of their club mates. Left to right (sitting) D. C. Smith, instructor; (standing) R. G. Robertson, designer of buildings; H. A. Abdallah, secretary; D. Moreland, C. H. Latimer-Needham, J. M. Symons, D. E. Culver and H. A. Petre, instructors; J. R. Ashwell-Cooke, chairman; L. C. Williams, instructor. The background is the caravan of the Nomad Caravan Co. and the car on the left is the "Wizard" which towed it up the 1:3 gradient to the camp. One of the tents may be seen on the right. (FLIGHT Photo.)



OF BIRD-LIKE PROPORTIONS : A three-quarter rear view of the Nyborg sailplane. The designer is standing by the right-hand wing tip and his assistant, Mr. H. Green, is in front. The dimensions are :—Area, 45 sq. ft. ; span, 32 ft. ; chord, 16 in. ; weight, 370 lb., including 150 lb. for the pilot ; the gliding angle at 57 m.p.h., according to Mr. Nyborg's calculations, should be about 1 : 54. The large rudder is being used temporarily for auto-towing, and if possible will later be discarded for a much smaller one which will be assisted in obtaining directional control by two small drag-producing flaps under each wing-tip. The trailing edge of the wing inside the aileron is divided into three flaps on each side which can be used for increasing the effective camber and as air brakes. (FLIGHT Photo.)

a sort of tractor, and with a very low gear and spiked wheels it hauls the gliders wherever required ; a " Dodge " is used for auto-towing ; an " Alvis " forms the motive power of a pulley system whereby machines may be hauled back to the top of the Downs when launches are being made from there, and so on.

Sunday night was a night which will be remembered by all those in the camp. About 1 a.m. the wind must have reached its maximum, and several tents were blown down, the occupants fleeing in the torrential rain to one of the hangars with such of their bedding as they had been able to retrieve. Even the sailplane trailers were blown over, and, in fact, the only persons who can have been reasonably comfortable were those who had caravans. There were several of these, some including two or three which were situated in an adjacent field, where they formed part of the permanent equipment of the camp, as their owners come and stay there almost every week-end ; another was one of the trailer type, a Car Cruiser, and very luxuriously fitted with four berths. This caused considerable excitement when it arrived in charge of a representative of the Nomad Caravan Co., of Malden, being towed by a Hillman Wizard car, for it came straight up the steep part of the hill to the camp. This hill, though short, is certainly 1:3 in parts, and this performance, which, by the way, was repeated for fun, showed that the prospective caravaner need have no fear that ordinary hills will prove a bar to his tour. Caravans are being increasingly used by the gliding fraternity, and at every site one sees many versions of them, that favoured by some of

the London club members for a permanency being a converted pantechicon!

Those who maintain that there is little value to be had out of gliding should attend a camp like this. The keenness displayed in gaining aerodynamical knowledge is alone full justification for the existence of the club, and this is an entirely admirable trait of the members, for it is certain that to be a really expert sailplane pilot one needs to be an enthusiastic meteorologist and a keen student of aerodynamics. A sailplane has to be *flown*—that is, its aerodynamical qualities have to be understood and used to the full—and it cannot be denied that one who is thus expert must certainly make a better pilot of power-driven aircraft than one who has not that previous experience.

LONDON TO NEWCASTLE AIR RACE

The Newcastle Aero Club Trophy (late *Evening World* Trophy) is the chief award for the London to Newcastle Air Race organised by the Newcastle-upon-Tyne Aero Club.

This is the third year this race has been held, last year's race being won by Mr. D. I. M. Kennard on his Klemm (Cirrus III) at a speed of 130.379 m.p.h.

Following are the skeleton rules:—

Date.—Saturday, May 28, 1932. First machine leaves Brooklands about 1.30 p.m.

Organisation.—The race will be conducted by the Newcastle-upon-Tyne Aero Club, Ltd., under the rules and

HIGH ASPECT RATIO : A front view of the Nyborg sailplane which gives a good idea of its narrow chord wings. Mr. T. G. Nyborg is on the left, Mr. H. Green on the right, and the pilot in the cockpit is Mr. L. C. Williams. The wing spar is a solid 4 in. by 3 in. spruce beam tapered from the root and the wing is plywood covered. To obtain his design Mr. Nyborg has scaled up the best soaring birds, thus his sailplane has the same loading and dimensions one would expect, say, an albatross of the same weight to have. (FLIGHT Photo.)



regulations of the F.A.I. and the competition rules of the Royal Aero Club.

Aircraft.—The race is open to any type of aircraft, the weight empty as shown on the Certificate of Airworthiness not exceeding 1,500 lb. The weight of water in the radiators shall count in the empty weight.

Pilots.—The race is open to pilots possessing an "A" or "B" licence.

Course.—The race will be flown over a course of approximately 254 miles, starting at Brooklands Aerodrome and finishing at Cramlington Aerodrome.

Handicap.—The machines will be handicapped for a non-stop flight between Brooklands and Cramlington according to estimated performances.

The **Entrance Fee** is £3 3s. per machine, and must be sent with entry forms.

Entry Forms can be obtained from the Hon. Secretary, Newcastle-upon-Tyne Aero Club, Cramlington Aerodrome, Northumberland, and must be sent in 21 days before the race.

Late Entries will be received, at a fee of £5 5s. per machine, up to seven days before the race.

Prizes.—First, £50 and the Newcastle Aero Club Trophy (to be held for one year); second, £25; third, £15; special prize, £10 for fastest time; special prize, £10 for first lady to finish. (N.B.—Third prize will not be awarded if there are less than six competitors.)

BROOKLANDS

The School has carried out nearly 50 hr. flying during the week, and three pupils—Messrs. Weiss, Price and Hordern—have obtained their "A" licences. Mr. Carling has now completed his three hours solo flying, and should soon be the proud possessor of his licence.

Mr. Hall has been sent off on his first solo, and is now busy trying to get through his three hours.

Mr. Holbeach has successfully carried out his height test.

Four new pupils were welcomed this week; Mr. G. R. Carless from Australia, Mr. Mallet and Miss Moodie, the latter having received instruction at the Cawnpore Flying Club was therefore able to be sent off solo almost immediately. Mr. R. G. Munro, from Sumatra, has also joined the School to obtain his "A" licence.

Mr. G. Selfridge and Mr. H. Murray-Phillipson are making good progress with their blind flying, which course is also being taken by Mr. Robeson.

Members of the Press Aero Club have been carrying out a considerable amount of flying.

On Tuesday a move was made into the new Brooklands Club House, and one and all expressed their admiration. An unofficial party was held to christen the club house, and the B.A.R.C. authorities presented Capt. Davis with a very handsome silver cigarette box in recognition of his services.

READING AERO CLUB

On Saturday, March 19, members of the Phillips & Powis School of Flying were lucky in being able to inspect and try out the new D.H. "Fox Moth."

The Managing Director, Mr. C. O. Powis, took the machine over the week-end on a tour of his agency territory. After Reading, Leicester was visited on the same day. The machine met with general approval, and the following morning was flown off to visit the Midland Club at Castle Bromwich, then to the Northampton Club, back to Reading and on to Bristol the same evening. During the trip the different club instructors tried the machine and found it delightful, while many members and interested persons flew as passengers.



AIRISMS FROM THE FOUR WINDS

King Albert's Congo Visit

KING ALBERT of Belgium who, as previously reported, is paying a visit to the Congo, left Brussels on March 24, and journeying *via* Imperial Airways, reached Alexandria from Brindisi on March 26, flying on next day to Wadi Halfa, escorted by three R.A.F. planes. He is flying as far as Juba, whence he will proceed by motor car.

French Flight to New Caledonia

THE three French airmen, Deve, de Werneich-Puyrazean, and Munch, who are flying from Paris to New Caledonia, in the South Pacific, arrived at Port Darwin on March 26, leaving at daybreak next day for New Caledonia, *via* Brisbane.

Hamilton and Coupland Returning

FLT.-LT. LESLIE HAMILTON and F./O. R. K. Coup-land, who crashed in Apulia last February while attempting a record flight from England to Australia, are returning to England by train.

Singapore-Darwin Flight

THE three "Southampton" flying-boats of No. 205 F.B. Squadron which left Singapore (their home station) on March 15, reached Darwin in Australia on March 22.

R.A.F. East African Flight

THE four Fairey III.F machines of No. 14 (Bomber) Squadron which left Heliopolis on January 11 on a tour through East Africa, under the command of Flt. Lt. R. L. R. Atcherley, returned to Heliopolis on March 29. They have toured Kenya, Uganda, and Tanganyika for three months, and have practised army co-operation work with various units of the King's African Rifles. Government officials have been flown over remote parts of their districts. The itinerary allowed for 7,000 miles, but probably the mileage covered was nearer to 10,000. The flight has been a complete success.

Another Byrd Antarctic Expedition

REAR ADMIRAL BYRD is planning a new expedition to the Antarctic this year, and hopes to set up a base on the Polar plateau within three hundred miles of the South Pole. From this base motor transports, aeroplanes, and dog teams could proceed wherever needed. The aeroplanes, it is expected, will be able to land with six

months' supplies aboard, and Admiral Byrd is hoping to land at the South Pole. In his 1928-1930 expedition he flew over the Pole but could not land as he was running short of fuel.

Sir Alan Cobham's Air Tours

SIR ALAN COBHAM is organising a series of aviation displays to be given in various parts of the country throughout the summer, with the object of stimulating public interest in British civil and commercial aviation.

The Long-Distance Record

THE French airmen, Bossoutrot and Rossi, have beaten the world's long-distance record (closed circuit) at Oran, where they landed on March 26, after having covered 10,605 km. (6,590 miles) in 76½ hours. Their machine was a Blériot monoplane with a 600 h.p. Hispano-Suiza engine, and Wakefield Castrol was used throughout. The previous record, held by Le Brix and Dorset, was 10,372 km. (6,265 miles).

Vickers "Vildebeest" for Spain

A VICKERS "Vildebeest" torpedo carrier, fitted with a water-cooled Hispano engine, started on March 24 on a delivery flight from Brooklands to Toblada Aerodrome at Seville. Flying *via* Paris and Biarritz, Madrid was reached on March 27, where a demonstration of the capabilities of the aircraft was given before proceeding to Seville. This machine is being supplied to the order of the Spanish Government to Vickers (Aviation), Ltd., and is part of a contract for 26 machines of the same type which will be built under licence in the factory of Construcciones Aeronauticas S.A. (C.A.S.A.) at Cadiz. The "Vildebeest" is fitted with the usual landing wheels for this flight; it can quickly be converted to a twin-float seaplane and the floats for this purpose have been despatched to Spain separately. This particular type was chosen by the Spanish Ministry of Marine after an extended series of competitive trials.

R.A.F. Motor Boats

AN order has been placed with the British Power Boat Company for 18 motor-boat tenders for R.A.F. seaplane stations at home and overseas. The new boat is described as a considerable improvement on the type which it replaces. It is fitted with two 100-h.p. Meadow engines.



A NEW AMERICAN PURSUIT PLANE : The Curtiss P 6-E biplane which was recently tested for the U.S. Army Air Service at Mitchel Field. It is claimed to have a ground speed of 220 m.p.h. or over 300 m.p.h. in a dive.

Land and Air Transport

THE Under-Secretary for Air was asked in the House on March 23 whether he would take powers to prevent passengers and goods being carried by aeroplanes at charges or speeds involving competition with the railways. The answer was in the negative; whereupon Capt. Balfour asked if the Minister was aware that in the case of the South African route no such danger arose, as it was quicker in most cases to send mails by boat rather than by air.

The Zeppelin LZ 129

SOME details are now available about the new Zeppelin airship which is under construction at Friedrichshafen. Its length will be 247.80 metres (about 800 ft.), as against the *Graf Zeppelin's* length of 235 metres. The greatest diameter will be 41.20 metres (about 135 ft.), as against 30.52 in the earlier ship. That is to say, that the fineness ratio will be more nearly that which was adopted by our British designers for R.100 and R.101. The new ship will have a gas capacity of 200,000 cubic metres (7,060,000 cub. ft.), which is almost double that of the *Graf Zeppelin*. Helium will be used to inflate the ship, and the four Maybach 850-h.p. engines will run on heavy oil fuel. The disposable load will be 88 tons, divided as follows:—Fuel, 60 tons; water ballast, 6 tons; other water, 4 tons; baggage and mails, 8 tons; equipment, 3 tons; 50 passengers, 4 tons; 25 members of crew, 2 tons; allowance for moisture on hull, 1 ton. The gas capacity of the *Akron* is 6,500,000 cub. ft.

Architects and Aerodromes

On Monday, April 11, a paper on "Aerodromes" will be read at the Royal Institute of British Architects by Mr. John Dower, M.A., A.R.I.B.A., who is secretary of the R.I.B.A. Aerodromes Committee. The paper will be read at 8 p.m., and an exhibition of photographs and drawings of aerodromes will be held at the R.I.B.A. from April 12 to April 30. This exhibition will be open from 10 a.m. to 8 p.m. (Saturdays 10 a.m. to 5 p.m.). Members of the general public who are interested in the subject are cordially invited to attend. The address of the R.I.B.A. is 9, Conduit Street, London, W.1.

Junkers in Difficulties

FROM Germany it is reported that the Junkers works of Dessau are in financial difficulties and have been obliged to ask for a compulsory judicial composition with its creditors. Apparently it is not a question of the firm being insolvent in the ordinary sense of the word. It is estimated that the firm's assets exceed the liabilities by some ten million marks, and the trouble seems to be lack of liquid capital. The German Government had previously advanced some 800,000 marks, but is unwilling to advance any more, and asks that the rest should be raised on the private market. FLIGHT readers will probably know that the Junkers interests include not only the aircraft works at Dessau, but also aero engine works, motor engine works, heating and ventilating equipment, and gas stoves and geysers, etc. Altogether the Junkers interests

employ some 3,000 workers, and it is to be hoped that means will be found to keep the works going.

An L over D of 50 !

FROM Italy it is reported that Dr. Bernasconi has designed and built a monoplane with a gliding angle of 1 in 50. Details are not available at the moment, but it is stated that in flight tests the machine developed a maximum speed of 91 m.p.h. and a minimum speed of 56 m.p.h. This small speed range, and high minimum speed, does not quite appear to tally with an alleged take-off in three seconds and a distance of 50 ft.

An Innovation at Hatfield

THE De Havilland School of Flying at Hatfield has recently made an interesting improvement to the curriculum of their flying course. While it is true that they certainly do not agree that blind flying should be practiced extensively by amateurs and private owners, since to do so might well be a dangerous matter, yet they recognise that a reasonable experience of flying without a visible horizon is definitely of great importance. For example, fog, low clouds and other forms of bad visibility may often be met during a flight across England, and it has therefore been decided that every pupil taking a course of flying instruction at Hatfield will be given sufficient experience of flying by instruments alone to enable him to handle a "Moth" or "Puss Moth" safely. This special tuition is being included without extra charge, as it is felt that it should be part of the normal training.

Private Instruction in Flying

CAPT. R. H. STOCKEN, who recently set up in practice as an independent test pilot and consultant, is also prepared to "coach" privately in flying instruction. Capt. Stocken has no intention of competing with existing clubs and flying schools which give sound training at low prices. His object is rather to give, by individual attention, a special "polish" to those pupils who aim at a high degree of finish in their flying, or who wish to be instructed in the more advanced forms of pilotage. He has found from experience that the majority of pilots, when they have had up to 50 hr. solo, very often have got into a slack way of flying and need "brushing up." The instruction can be given on pupil's own machine or the aircraft can be supplied. Capt. Stocken, who holds a G.A.P.A.N.O.B.E. Instructors' Certificate, has, of course, had a varied experience of instruction. He qualified as an instructor (category A.1) in the R.F.C. in 1917, and was lent to the French Aviation Service as an instructor during 1918 and 1919, and, in consequence, is familiar with instructional methods on the Continent. Later he was on the permanent staff of instructors of the Central Flying School, R.A.F., for three years (category A.1). At the present time, in addition to test work, he is coaching pupils of the de Havilland Technical School in the aeroplane which they have built themselves. Interested inquirers should write to Capt. Stocken, 56, Fleet Street, E.C.4.

AIRPORT NEWS

CROYDON

THE hopes of a great many were dashed by the inclement weather over the Easter. Everybody was looking forward to brilliant sunshine after the experience of the few days before the holiday. As regards Continental traffic, passenger figures created a new record, Imperial Airways and Air Union Paris services having been full to their utmost capacity. Imperial Airways in particular were booked full for all services several days beforehand, and those coming along on the off-chance at the last minute were disappointed, as there was not a vacant seat. It is an undoubted fact that the H.P. 42's are proving a very great attraction to passengers, and it is most advisable for anybody contemplating travelling to book as many days ahead as they possibly can. The joyriding over the holiday was not what it would have been had we been given really good weather, and one feels very sorry for the companies concerned, as holidays mean a great deal to them in the way of increased business. Friday was a very good day, however, every available machine being kept very busy. Visitors have been plentiful, and many large parties were conducted round the aerodrome, although the desire to try a joy-

ride was marred by the fact of the high wind and the rain.

Imperial Airways had a W.10 in front of the public enclosure all day on Friday, with a notice advertising joyrides at 10s. 6d. per time, but no flights were made, as the smaller companies proved quite able to cope with this side of the business. It is agreed that the large weekend parties that take flights with Imperial Airways are a good proposition, and really help to educate the public to travel by air, but the smaller companies are well able to cater for the passenger that only wants a flight round the aerodrome, more as an entertainment than anything else.

This Easter has been marked by the absence of private owners to Croydon, but I believe a great many of these have been over to the Continent, and have kept our worthy friends at Heston very busy, thereby relieving Croydon of most of the private traffic—rather a very good thing, as it would only add to the danger that the Air Ministry have decided must be removed in August.

In conclusion, may Whitsun weather prove better than Easter brought us.

The traffic figures for the week were:—Passengers, 917; freight, 41 tons. P. B.

HESTON AIR PARK

MONDAY, March 21.—We omitted to report in last week's notes that just after dusk on Sunday evening, March 20, Lt. Cathcart-Jones arrived on the "Stinson Jnr." G-ABTZ. This machine is well fitted for night landings, as strong electric lights are placed under the wings, which show up the ground forward in an excellent manner. Lt. Cathcart-Jones had arrived from Paris to clear Customs.

Capt. Barnard arrived back from Berlin in "Fokker FVII" G-EBTS, after non-stop flight, with the English Ice Hockey Team. The journey back was made in 6 hr. 20 min., in spite of head winds; the outward journey took 6 hr.

The "Junkers" machine of Personal Flying Services, Ltd., G-ABDC, left for Paris at 7 a.m., with three passengers.

TUESDAY, March 22.—G-AAUS, the "Moth" machine of Texaco Oil Co., arrived from Baldonnel to clear Customs.

Sqd. Ldr. H. G. R. Malet, R.A.F. (retired) has purchased a "Redwing," and proposes to transfer his activities to civil aviation, after 17 years' service.

WEDNESDAY, March 23.—Capt. Barnard's "Fokker" G-EBTS departed for Hamble for overhaul. G-ABDC ("Junkers") returned from Berck.

The petrol companies appear to be preparing for a busy summer in aviation, as two new machines made their appearance at Heston to-day. Lt. R. Bentley arrived with G-ABUS, the new Comper "Swift" acquired by B.P. & Shell Co., while Mr. Hanstock took delivery from Henly, Ltd., of the new "Puss Moth" G-ABUJ for the Anglo-American Oil Co.

Lady Catherine Willoughby, the eldest daughter of the Earl of Ancaster, had a flying lesson on Airwork, Ltd., School "Puss Moth," and expressed her delight with the machine.

G-ABSU ("Stinson Jnr.") cleared Customs for the South of France after having undergone minor repairs.

The first of the private owners at Heston to go on Easter tours departed to-day, when Mrs. Rhodes-Moorhouse and her son William, in their "Moth" G-ABOA, left for Tours via Paris. They are making a circular tour via Biarritz, Marseilles, Dijon and Paris.

THURSDAY, March 24.—Mr. A. B. Gibbons, on his Pobjoy "Klemm" (G-ABTE), cleared Customs and left for Paris at 8 a.m. in a very thick fog.

Mr. Loel Guinness, with one passenger, left later in his "Puss Moth" (G-AAXR) for Paris, while Mr. Gordon Selfridge, Jnr., cleared Customs for Paris with his "Puss Moth" G-ABMS, from where he has gone on to Berlin.

Mr. Harbin arrived from Paris in his "Puss Moth" G-ABTV.

FRIDAY, March 25.—We woke up feeling that the old saying "The better the day, the better the deed" must really be true. It was a wonderful day, and from early morning we were kept very busy. The School was fully occupied, while Customs had many clearances, among them being Mr. S. Davenport, for Biarritz, in his "Puss Moth" G-AAZM; Mr. Russell, and one passenger, to Berck in "Moth" G-AAKU; Mr. Leicester, to Paris, in "Moth" G-ABBX; Mr. Styran in G-ABFP, the Blackburn "Segrave" of B.A.N. Co., with two passengers (Mr. Sweeny, captain of the Oxford golf team, and the Hon. Max. Aitken), for Le Touquet; Mr. Hey and one passenger in "Puss Moth" G-ABLR, to Berck; and Mr. Garnet and one passenger in "Puss Moth" G-AAZW, to Berck.

PH-AFN ("Pander" with Gipsy engine) arrived from Amsterdam with Herr Vantien and passenger. Herr Vantien flew on to Liverpool, returning on Saturday, the 26th inst., when, after a very rough trip in fog and rain, he and his passenger were thankful to find the new hotel available at Heston. They stayed the night here, and left for Holland on Sunday morning. We were very interested to hear that Herr Vantien had flown PH-AFN solo from Holland to Java and back.

Among the private owners, of whom there were many, who took advantage of the fine weather we noticed Mrs. Spencer Cleaver, with her "Puss Moth" G-ABFV, and Capt. Cochrane with his "Puss Moth" G-ABMN. Mr. Amherst Villiers (of Amherst Supercharges) took the air in one of the School machines.

We were glad to welcome back Capt. Neville Stack, on his return from Czecho-Slovakia, where he has been piloting Mr. Bata, the millionaire boot manufacturer.

Capt. Stack gave a very interesting account of their trip to India in a "Fokker" F.7, fitted with three Walter "Castor" motors, each of 240 h.p. Particularly interesting was his account of his treatment in Turkey, where he said he received every courtesy and help and was made the first British pilot member of the recently-formed Aero Club of Turkey. The members of the Aero Club of Turkey wished to welcome to the club any strangers, in particular British flyers, who visit Constantinople. They pointed out the necessity of having permits and passports in order so as to obviate any Customs or official difficulties.

Capt. Stack gave it as his considered opinion that the use of an aeroplane for business purposes for long-distance journeys results in great saving of time, thus allowing much more territory to be covered and more sales to be made, and so increasing business without increasing the staff. As an example, he gave Mr. Bata, a very clever business man, who keeps a fleet of ten aeroplanes with eight pilots solely for business purposes. By his factory in England, which is now being erected, Mr. Bata has had

a landing ground laid out, with hangar accommodation.

SATURDAY, March 26.—G-AAVD ("Puss Moth"), of Air Taxis, cleared Customs and left for Dublin at 9.15 a.m.

Mr. Hugh Kindersley was among those renewing their air activities on School machines.

Mr. Stace, of Henlys, Ltd., has gone on a six-weeks' tour demonstrating an Avro "Avian" at selected places.

The weather did not treat us kindly, and with a nasty rain, flying activities were very much curtailed.

SUNDAY, March 27.—The weather again was not kind to us, and, although several people arrived with the intention of "leaping into the air," decided against it when they felt the keen wind and drizzling rain.

We would like to take this opportunity of warning all pilots proceeding to Germany to equip themselves with an insurance policy covering third party risks, as without one a well-known private owner has been detained in Berlin

until such time as he can produce evidence that he is so covered.

To encourage pilots to interest themselves in navigation as opposed to "Bradshaw," Airwork School of Flying, Heston, have decided that all pupils learning on School machines shall be entitled to one half-hour free instruction at Capt. Ferguson's School of Navigation for each hour of dual instruction. We feel sure that all pupils will welcome this innovation.

It is interesting to note that, in spite of the monetary difficulties, the Customs clearances at Heston from January 1 have doubled themselves as compared with the same period of last year.

Henlys, Ltd., report among their sales for the past week that of G-EBUF (Hermes II "Moth"), formerly the well-known machine flown by Capt. Neville Stack, and G-ABDN ("Sports Avian").



A Wireless Telephone for Air Taxis

AN air-taxi fitted with Marconi telephone equipment which enables the pilot to keep in touch with the ground is the latest addition to London's transport facilities. This is the "Puss Moth" aircraft flown by Capt. Laurence Hope, of Air Taxis, Ltd., which is being equipped with the most modern type of Marconi light aeroplane apparatus. Incorporating a special telephone transmitter as well as a receiver, the apparatus enables the pilot not only to receive weather reports and other communications regularly broadcast from ground stations, but also at any time to speak to the aerodromes himself and ask for any information he may require.

Should he, for instance, encounter during flight a bank of fog or thick cloud, he can call up the nearest suitable ground station, confirm his position by wireless direction finder, learn whether the conditions of bad visibility are local or general, and judge with confidence whether it is possible to continue to his destination. Such services are regularly performed for the pilots of passenger-carrying aircraft on the regular air routes by such wireless stations as those at Croydon, Lympne, and Pulham, and they are also available to the owners of private aircraft fitted with suitable wireless transmitters and receivers.

Capt. Hope uses his "Puss Moth" air-taxi very largely for newspaper work, where speed is of first importance, and he realises that on many occasions such information would be very valuable to him, enabling him to decide, while still in the air, the quickest and safest means of delivering his photographs or other press matter. At the same time, his waiting colleagues can obtain information of his movements, so that unexpected delays are reduced to the minimum.

The Wireless Equipment

The light aeroplane wireless equipment adopted by Capt. Hope is the Marconi Type AD22, a light-weight apparatus designed on the same lines as, but of smaller power than, the Marconi aircraft

transmitters and receivers which are standard equipment on all the passenger-carrying aircraft of Imperial Airways, Ltd., and other air companies in many parts of the world.

It is normally arranged for telephone transmission on the wave band of 850-950 metres—the International aircraft wave band—but a quick-change switch is provided to enable transmission to be made on the 600-metre wavelength used by all ships, in case of emergency during cross-Channel or over-sea flights.

The transmitter and receiver are fitted in a single instrument box which is installed in a convenient position in the aircraft, arrangements being made for the operation of the set by remote control when found necessary. Power is supplied from a generator driven by a constant speed windmill fitted in the slipstream; this generator can be arranged not only to supply power for wireless purposes, but—by means of a simple switching device—to feed a 12-volt accumulator which can be used as a common source of power for both wireless and navigation lights, thereby effecting a large saving in weight over systems in which entirely separate wireless and lighting circuits are employed.



The Marconi AD22 light aircraft set installed in a "Puss Moth" air taxi operated by Capt. L. Hope.



Errata

In the description of the Avro "Cadet" published last week a slight confusion arose in connection with the lever operating on a notched quadrant in the front cockpit, with the corresponding lever in the rear cockpit operating via a Bowden cable. These levers are not, as inadvertently stated, for operating the tail trimming, but for hand control of the wheel brakes. The levers operate the brakes uniformly on both wheels. By partly applying one of the

hand-brake levers and then using rudder, each wheel may be braked independently. The tail-trimming gear is operated in the normal Avro fashion by means of a hand wheel on the other side of the cockpit. In the description of the undercarriage it was not made clear that shock absorbers of the oleo type are incorporated in the telescopic legs, and that the steel springs have been introduced to take the place of the compression rubbers previously used in the Avro oleo undercarriages.

AIR TRANSPORT



The Breda 32 Commercial Monoplane

(Concluded from p. 260.)

IN last week's issue the general features of the Breda 32 were dealt with. This week we propose to review briefly the structural design of this interesting Italian machine.

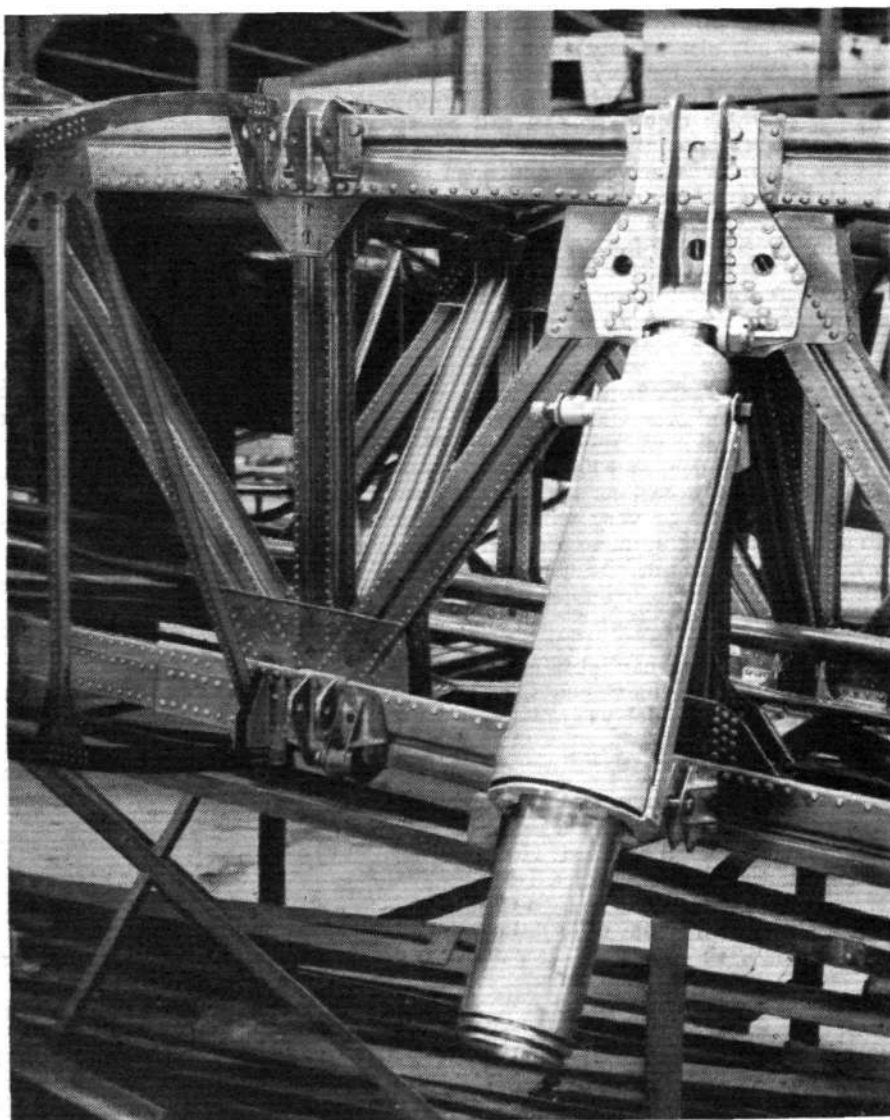
The fuselage of the Breda 32 is an all-metal structure in which the duralumin skin assists in stabilising the internal framework. The latter is composed of four longerons placed in the corners in the usual manner, joined by vertical and horizontal struts, and braced by the metal skin. The longerons and many of the fuselage struts are of built-up box section, corrugations being used in the walls of the longerons for stiffening them under compression loads. The boxes are so designed that all rivets are external, and easy to get at for riveting and holding up.

In the curved roof of the cabin the construction is slightly different, the cross members being in the form of cambered deck beams and the skin bracing reinforced by diagonal members running from corner to corner in the bays, crossing each other in the centre. The roof construction of the Breda 32 is not unlike that of the forward portion of the Handley Page "Hannibal" fuselage.

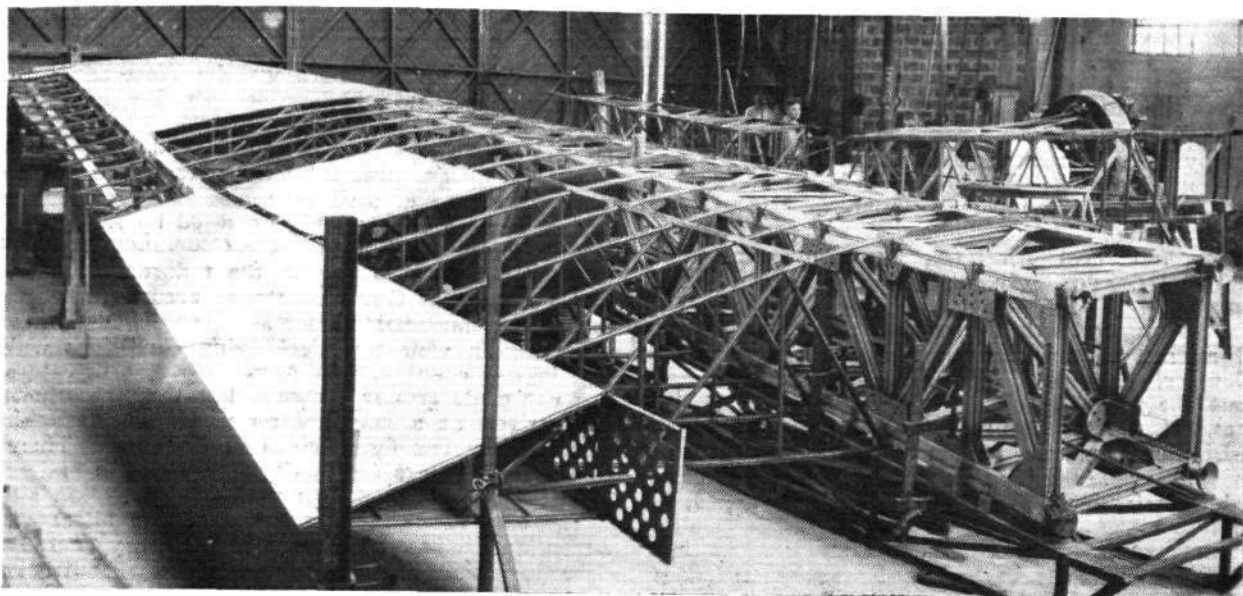
Although superficially the skin of the Breda 32 appears smooth in the photographs, it is in reality corrugated, but in a somewhat unusual manner. In place of the regular and uninterrupted corrugations with which the Junkers firm have made us familiar, the stiffness is obtained, in the Breda, by lines of interrupted corrugations. The same principle is used in the metal skin of the wings, and the principle of it will be understood from an inspection of the sketch on page 287. Whether this form of stiffening is better than the plain corrugations used by Junkers is difficult to say. The depth of the corrugations is less, and there are considerable flats between the corrugations, although the small gaps between the longer are certainly reinforced by a pair of shorter "blisters." The Breda skin looks as if it would be rather easier to apply, as the amount of flattening to be done at edges should be a good deal less than in Junkers practice.

The Breda 32 wing construction is particularly interesting to British readers just now, because it carries out in a different way the same idea as that underlying the Monospar wing design. In place of Mr. Stieger's I-section metal spar, torsionally braced by wires, the Breda single spar is a duralumin box girder, in itself fairly well strong enough to resist torsional as well as

bending and shear loads, but reinforced by a metal skin. If riveting is considered a big job, the Monospar version of the single-spar construction appears the simpler. In the Breda spar there is a very large number of rivets, each member of the girder being a riveted-up box, strut or tie, and the separate boxes being riveted together. The spar



DETAILS OF WING AND UNDERCARRIAGE : This photograph gives a good idea of the construction of the single spar, which is a girder built up of box-section booms and struts. The telescopic leg of the undercarriage is attached to the spar, and housed inside the wing. The other lugs seen are for the support of the engine mounting.



THE BREDA 32 WING : A general view of the port wing, showing single spar, ribs, skin, etc. The four pipe unions by which the wing is attached to the wing root are seen at the right-hand extremity of the picture.

does, however, give an impression of very great strength, and the great quantity of riveting may be worth while.

The ribs are light duralumin frames attached by light brackets to the corner booms of the single spar, and the attachment of spar to fuselage, or rather to the wing root permanently built into the fuselage structure, is by pipe unions, much as in the Junkers machines. As, however, there are but four main spar booms, there are only four of these unions on each side. The metal skin of the wing is stiffened by "blisters" in the same way as the fuselage skin, but the extreme leading edge is covered with smooth duralumin.

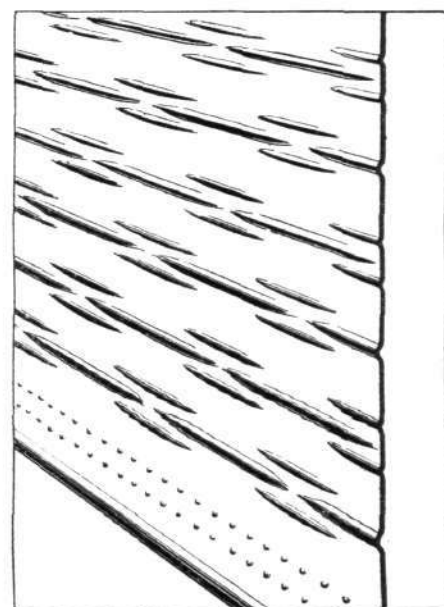
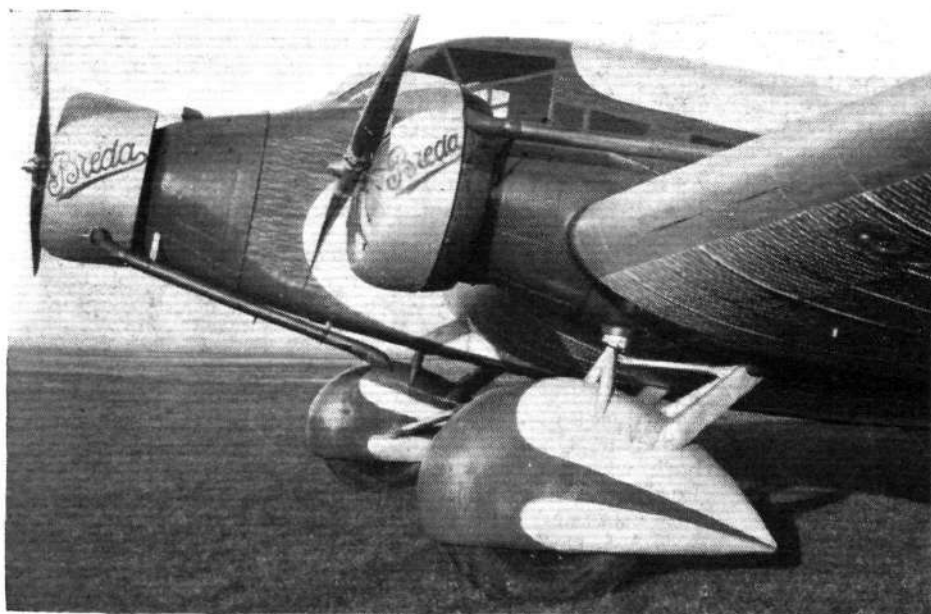
The engine mountings of the Breda 32 are of welded steel tube construction, and rubber buffers are incorporated in the fittings which secure the engines to fuselage and wing spar respectively.

In their search for aerodynamic cleanness the Breda engineers have taken considerable pains to "bury" everything possible inside the fuselage or wing, and to fair such excrescences as were unavoidable. The undercarriage is a case in point, and repays a closer study. Each undercarriage half comprises a wheel with a "spat" over it, two supporting forks, and a lateral bracing member. The photograph on this page will show the general arrangement.

The rear fork is the radius rod of the undercarriage, while the front fork has its head terminate in a ball and socket joint, the telescopic tube which is the upward extension of the front fork being housed inside the wing covering, and anchored to the front upper corner of the wing spar, as shown in the photograph on the previous page. As the telescopic leg is attached to the spar at the same point as the outer member of the wing engine mounting, the weight of the engine is taken by the undercarriage practically direct. The fairings around the wing engines are in the form of quickly detachable panels, so that inspection of and periodic attention to the telescopic leg can be made fairly readily. A result of the Breda arrangement is that the wheel does not move inside its "spat," which can, therefore, be brought closer to the ground or, in other words, enclose a greater percentage of the wheel.

Wheel brakes are fitted, and the alighting gear is completed by a castoring tail wheel fitted with low-pressure tyre.

Regarding our remarks last week on the gangway seats, we now learn that this arrangement was adopted at the request of the air operating company, and is *not* a Breda feature.



CAREFUL FAIRING : The wing engines of the Breda 32 are well cowled in, and the undercarriage has been streamlined by "spats" rigidly fixed to, and moving with, the wheel. On the right is a sketch showing how the metal skin is stiffened by "blisters."

AVIATION IN THE ARGENTINE

THE progress of aviation in the Argentine is given in the following extract from the "Economic Conditions in the Argentine Republic," issued by the Department of Overseas Trade:—

Aviation in Argentina may be classified under three headings: Army and Navy, commercial, and private or sporting.

The Army and Naval Air services are important units of the national defence force, and are constantly in need of new material. The tendency, at present, is to manufacture in the country and in pursuit of this policy a well-equipped aircraft factory has been erected at Cordoba. From October, 1930, to September, 1931, the factory turned out the following aircraft: 30 Gosport Avros, 30 Dewoitines, 11 Bristol Fighters (reconditioned), and 30 Lorraine-Dietrich engines. It is true that most of these machines and engines have been assembled from parts purchased from foreign manufacturers, but it is hoped, in the future, to make greater use of local material. Unless the Government decides to close down the Cordoba factory for economic reasons, it may be anticipated that the demand for complete aircraft, at least so far as the Army is concerned, will decrease. The Naval Air Force, however, will be potential buyers of flying boats for some time yet, as the factory is not capable of undertaking such specialised work.

With the exception of one or two small passenger-carrying ventures, commercial aviation in Argentina is entirely in the hands of foreign companies, of which there are two: the Compagnie Générale Aeropostale (Latécoere) and the Pan-American Airways Incorporated, with which is affiliated the Pan-American Grace Airways Incorporated (Panagra). The Compagnie Générale Aeropostale operates a weekly service between Buenos Aires and Paris, and the American Company a mail and passenger service from

Buenos Aires to New York via the West and East coasts of South America. The service via the East Coast was inaugurated on November 8. Neither of these companies is operated, as yet, on a commercial basis, both being supported by subsidies from their respective Governments. The passenger and mail air service between Buenos Aires and Asuncion, until recently operated by Aeroposta Argentina, a subsidiary of the Cie Générale Aeropostale, was cancelled in April owing to the failure of the Argentine and Paraguayan Governments to accord the service any measure of financial support.

Having in view the ideal flying conditions which prevail in this country, it is surprising that private aviation has not made greater progress, but the Argentine has not yet arrived at a stage of air-mindedness, and there are consequently few flying clubs in existence. There is undoubtedly a future for this type of aviation and scope for a well-conducted campaign with demonstration aircraft.

The sum of \$500,000 paper has been allocated to the Argentine Civil Aviation budget for the year 1931.

In July the Ministry of War signed a contract for the purchase of 15 Avro training aeroplanes with spare parts. The value of the order is approximately £50,000.

It is also reported that the Curtiss-Wright Export Corporation has negotiated a contract with the Argentine Government conceding to the State aircraft factory the manufacturing rights for a complete range of Curtiss-Wright Whirlwind and Cyclone engines. An initial order for 10 complete engines has already been placed with the Curtiss factory at Paterson, New Jersey.

A recent decree of the Argentine Provisional Government transferred the Department of Civil Aviation from its former semi-military control to a more independent footing as a dependency of the Department of Posts and Telegraphs.

Resumption of Night Air Mails

THE Postmaster-General announces that the night air mail service from London to Cologne, Hanover and Berlin which was in operation last year will be resumed on April 2. The latest time of posting in the air mail letter-box outside the General Post Office, London, will be 7 p.m. on weekdays and correspondingly earlier elsewhere, and the mail should reach Cologne and Hanover in time for the first delivery, and Berlin in time for the second delivery, next morning. Air mail correspondence for Austria, Bulgaria, Czecho-Slovakia, Danzig, Germany, Greece, Hungary, Latvia, Lithuania, Poland, Roumania and Yugoslavia will also be despatched by this service. Air mail parcels for Germany, Austria, Czecho-Slovakia and Hungary will be despatched by the night air service, and the latest time of posting air parcels at the General Post Office, London, will be 5.30 p.m. and correspondingly earlier elsewhere. The air mail service to Germany, Danzig, Latvia and Lithuania, the latest time of posting for which is 11 a.m., will be discontinued after the despatch of April 1. Commencing on April 4, the latest time of posting air mail correspondence at the General Post Office, London, for Belgium and Cologne (morning service) will be 6.45 a.m. instead of 7.45 a.m., and for France (first service), Italy, Switzerland, Algeria and Tunis 6 a.m.

instead of 6.45 a.m., and for French Indo-China 6 a.m. on Wednesdays instead of 6.45 a.m. on Wednesdays.

"Graf Zeppelin" Returns from Brazil

THE German airship *Graf Zeppelin*, which left Friedrichshafen on March 21 for Brazil, reached Pernambuco on March 23 within a few hours of schedule time. Dr. Eckener, who was in command, stated that the journey was uneventful. On March 26 the *Graf Zeppelin* left Pernambuco on the return trip—her 13th crossing of the Atlantic—and passing over Cape Oreus, Spain, at 7.8 a.m., March 29, landed at Friedrichshafen at 4.30 p.m., thus successfully completing the first of a series of round trips to Brazil which have been planned for this year's activities.

Junkers Persian Services Suspended

IN connection with the troubles of the Junkers Co., of Dessau—reported elsewhere in this issue—it has been decided to suspend the air lines operated by the Junkers Co. in Persia, viz., Baku-Teheran, Baghdad-Teheran, Bushire-Shiraz, and Isfahan-Teheran.

Another Arctic Air Route

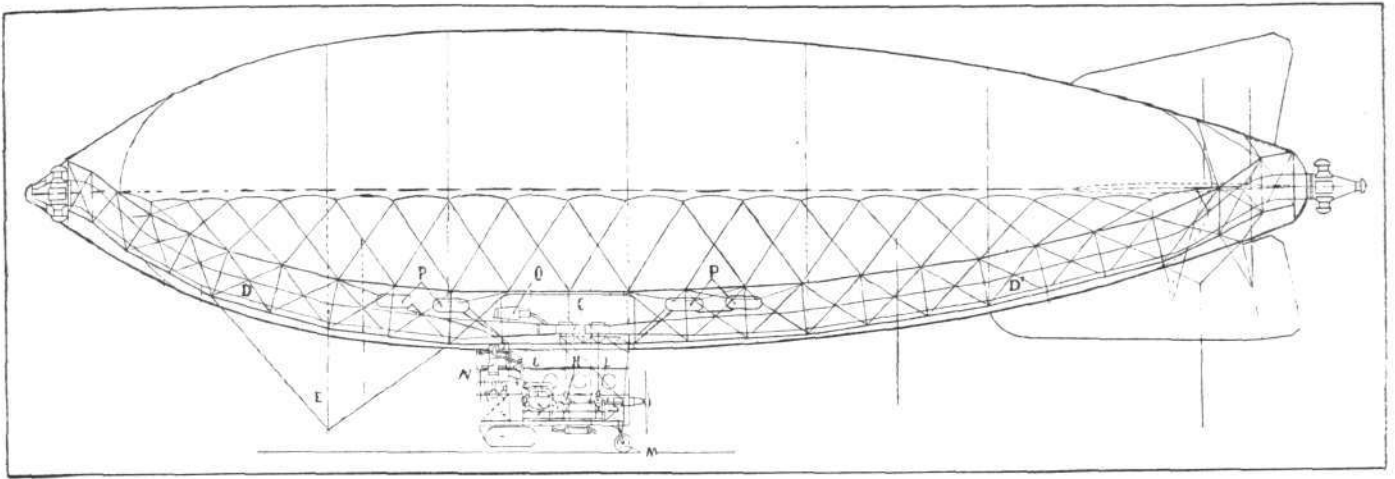
AN expedition to survey the possibility of an air route over the North Pole between Russia and America is in preparation by the Russian Soviet.

DEATH OF SIR GODFREY PAINE

REAR ADMIRAL AND AIR VICE-MARSHAL SIR GODFREY MARSHALL PAINE, K.C.B., M.V.O., died in London on March 23 at the age of 60. He had been on the retired list of the Royal Air Force since May 12, 1920. In retirement he preferred to use his naval rank rather than his Air Force rank of Air Vice-Marshal.

It was in August, 1911, that Capt. (as he then was) Paine first became connected with naval air work. He was then in command of the torpedo schoolship *Actaeon* at Sheerness, and the first four officers of the Navy and Marines who learnt to fly at Eastchurch, namely, Longmore, Samson, Gerrard and Gregory, were borne on the books of his ship. He took an active interest in their progress and did all that he could to help them. The

following year, when the Royal Flying Corps was formed with military and naval wings, Capt. Paine learnt to fly and was appointed Commandant of the Central Flying School at Upavon, which catered for the flying needs of both wings. His Assistant Commandant was Maj. (now Lord) Trenchard. In 1915 Capt. Paine was transferred to the command of H.M.S. *Daedalus*, which meant the R.N.A.S. station and depôt at Cranwell. In January, 1917, he became Fifth Sea Lord of the Admiralty and Director of the Royal Naval Air Service. After the armistice, Maj. Gen. Sir Godfrey Paine (he had been made a K.C.B. in March, 1918) joined the Air Council as Master General of Personnel. Afterwards he became Inspector General of the Royal Air Force and retained that post until his retirement in 1920.



A New Forlanini Airship

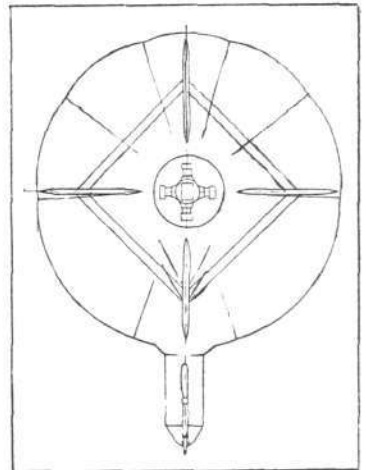
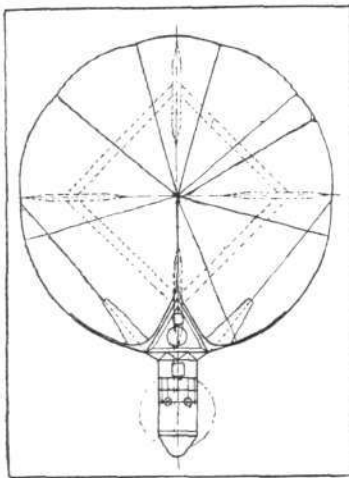
ENG. ENRICO FORLANINI, Italy's pioneer airship designer, has recently produced a small airship for the purpose of testing out a novel and interesting manœuvring system. This airship, the *Omnia Dir*, which is shown in the accompanying illustrations, apart from the feature referred to above,

and stern of the hull.

A stream of air from the blowers can be made, at will, to issue from one of the five valves of either group, and as these valves are so arranged that one points directly forward (nose group) or backward (stern group), one upwards, one downwards, one to port and one to starboard, it will be seen that the reaction of the stream of air can be made to move the airship backwards or forwards, downwards or upwards, and to starboard or port. It is claimed that by the operation of these valves, independently or in combination, extreme manœuvrability of the airship is obtained—it can revolve horizontally about its c.g., rise or fall vertically or climb and descend at a steep angle, and even move sideways, without discharging ballast.

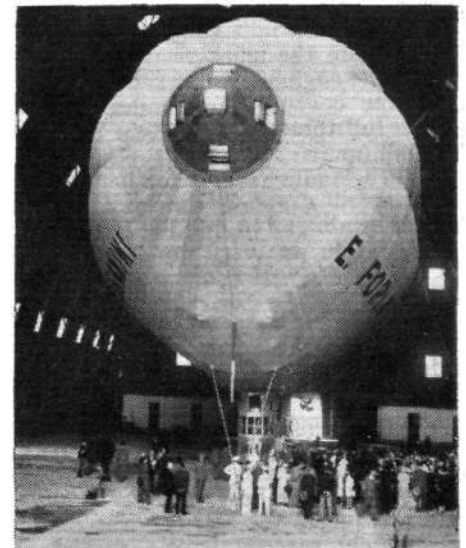
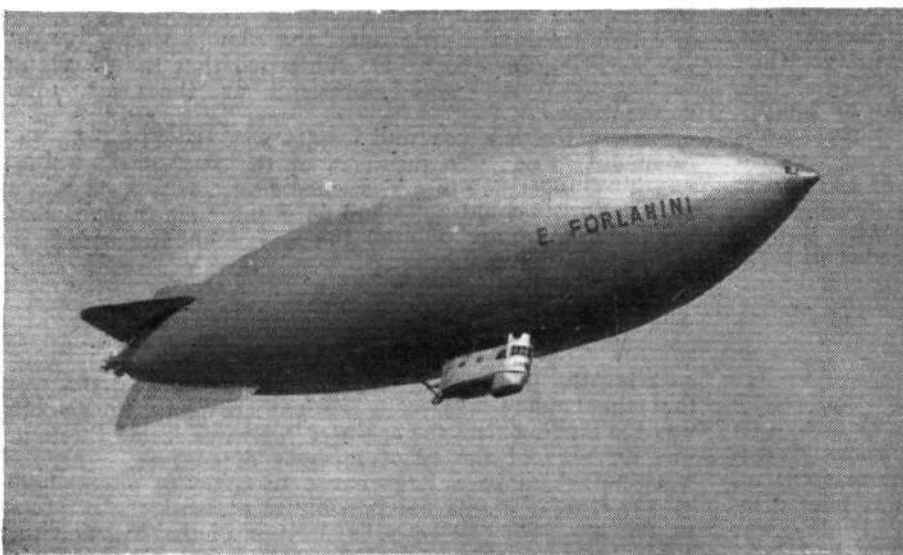
Another feature of the *Omnia Dir* is the provision of a mooring arrangement, consisting of an inverted pylon, "E," attached to the keel under the bow and braced fore and aft by cables. The apex of the pylon is about 1 m. from the ground when the airship is at rest on the latter, and is attached to a short mooring mast in such a way that the airship may turn to the wind freely, the car resting on the ground by way of a sprung wheel, "M," which can be retracted during flight.

C. R.



is of the semi-rigid type similar to the well-known Forlanini ships produced in Italy for years past, in which the envelope is attached to a metal triangular keel, carrying the control car and power plant, extending from stem to stern.

The *Omnia Dir* is 56 m. (183 ft. 9 in.) long, 13 m. (42 ft. 6 in.) diameter, and 4,000 m³. (49,448 cub. ft.) capacity. It is fitted—for normal flying and manœuvring—with an old type 150-h.p. Isotta-Fraschini engine driving a two-blade propeller. Where the *Omnia Dir* differs from other airships, however, is in the additional method of manœuvring both in the horizontal and vertical planes—by means of a form of "jet propulsion." Two centrifugal blowers, "C," driven from the engine, through clutches and shafts, "H," "I," are connected by ducts "D" and "D'" (extending along the keel) to two groups of five "valves" located respectively in the extreme nose



Two views of the Forlanini airship "*Omnia Dir*," built to test out a system of manœuvring control by means of "air jets" issuing from valves suitably located in the nose and stern.

WING COM. ORLEBAR ON HIGH-SPEED FLYING

WING COM. A. H. ORLEBAR, A.F.C., read a paper on "High-Speed Flying" before the Royal United Service Institution on March 23. Air Marshal Sir Edward Ellington, K.C.B., C.M.G., C.B.E., was in the chair. The majority of what the late commanding officer of the High-Speed Flight had to say is already familiar to readers of FLIGHT, but the paper seemed to make a great impression on the members of the two older services in the audience, and to give them a great deal of information which surprised them very much.

Wing Com. Orlebar started by saying that there were many ways of treating his subject. One might mention the number of cups of tea which could have been boiled by the heat generated by the engines, or one might go into very technical points. He proposed on that occasion to do neither, but to take a broad view of the subject and to discuss the use of high-speed flying.

The connection of the service with high-speed flying dated from 1926, when the first High-Speed Flight was formed in order to compete for the 1927 contest. For practice purposes they found various machines such as the Bamel on floats and the Gloster III, which had been flown only by civilian pilots and were quite strange to R.A.F. pilots. Their speed was about 240 m.p.h., only just faster than the modern types of R.A.F. aeroplanes. The speed of service types then was not above 150 m.p.h. Also these old machines were far inferior in structure and aerodynamic qualities to the new ones which were produced for the 1927 contest, namely, the Gloster IV and the Supermarine S.5. The actual racers were only delivered to the Flight a short time before the contest, and directly after the contest the Flight was disbanded. The 1929 High-Speed Flight were more fortunate in having racers of the previous contest as training machines, and very good training machines they proved.

He then explained the reason why the contest was held with seaplanes instead of landplanes. An increase of speed implied higher landing and taking-off speeds, and the extensive fairly level surface necessary for those high speeds could only be found on the water. Actually, he thought that unfaired wheels on landplanes set up worse drag than did the well streamlined floats of the seaplanes. Nearly all the pilots chosen for the High-Speed Flight came from landplanes, because the behaviour of the racing machines in the air resembled that of fighter landplanes more closely than it did that of normal seaplanes. But the take-off and landing were rather peculiar.

When taking off the machine would veer to the left until it gained sufficient speed to make the rudder effective. In the early stage the spray prevented the pilot from seeing straight ahead. He could do nothing except keep his head down to prevent his goggles becoming covered with spray, start off to the right of the wind, hold the stick to the right and back, and be ready to take control as soon as the machine gained way. In the latter stages of the run the floats were subjected to enormous stresses, and there were no shock-absorbers other than the V shape of the floats. This made one realise the strength of the structure. It took over a mile to get off the water, and another half-mile before the machine was climbing comfortably. Once when the engine cut out suddenly after just taking off, the machine covered three miles before it could be landed. From full throttle at a height of 200 ft. it took three miles to pull up.

When landing, the pilot had to approach at 160 m.p.h. The speed dropped slowly. The machine touched the water at about 110 m.p.h. It touched very gently, but the deceleration was very rapid, and the pilot needed to brace

his shoulders well back to prevent being thrown forward and breaking his goggles on the board. Good water was needed for a landing, but a glassy surface made it difficult to judge height. The take-off was the only real difficulty of high-speed flying. The floats had to travel at the speed of the world's record speed boat. They could not stand high waves, and usually when there were white horses on the waves (say a wind of 15 m.p.h.) it was too rough to take-off.

High-speed machines presented problems for propeller designers. The drag of the floats was high, and the coarse pitch of the propellers would only just permit of acceleration. But in the air the machines were simple to fly. They had but one instance of tail flutter, but it had been completely cured. All the accidents which had occurred had been during taking-off and landing. Flying the speed course was not uncomfortable to the pilot. He had little sensation of speed unless he looked at objects near to him. It was the control of power which made high-speed flying exhilarating—and it was exhilarating. The pilot had no need of conscious concentration. The machine would fly itself at 330 m.p.h. with hands and feet off. The consumption was about 3 m.p.g.

When turning it was possible, but not necessary, to get unpleasant effects. Sudden steep turns drew the blood from an artery which supplies the eye. The first effect was a feeling of tightness round the neck; then a blurring of sight, and finally "blacking out." But familiarity with the machine allowed turns to be made with only the feeling of tightness round the neck. There were no after-effects, and as soon as the machine was straightened out all such sensations vanished. It was inefficient to force the machine into a tight turn. On a course with long legs, where full speed could be regained between turns, it paid to do a gentle turn. One got the maximum benefit at 4G (when the pressure of the turn was four times the force of gravity). At 5G the "black-out" was normally felt, though pilots varied in this respect. It followed that what was best for the pilot was also best for the machine.

The lessons thus learnt could apply to the case of fighters diving to attack bombers. If they dived underneath and suddenly zoomed, they might black-out. If they did a slower turn, they would be at a greater range from the bomber's guns at the dangerous moment of turning.

In the High-Speed Flight, each pilot only got about 12 hr. high-speed flying. The pilot indulged in no special training, but it was a point of honour to confess if one felt unfit. An elastic belt had been tried, but it had not been a success. It was advisable to wear a loose collar. Of the 12 pilots who had been in High-Speed Flights, over 50 per cent. had been non-smokers and teetotallers.

Without the stimulus of a Schneider Contest, it would have been impossible to get the co-operation of all the experts. The result was a freak machine, but the knowledge gained had been very useful. The cost was great, but the knowledge had been cheap at the price. All progress levied a toll in cost and usually in lives; but most of it was done in secret. He did not run down exploration, but he had noticed that one brief Antarctic expedition had cost two and a-half times the sum expended on the British Schneider effort. He submitted that the results of high-speed flying were as useful as those of polar exploration.

Among the less concrete results was the effect on the human element. To members of the High-Speed Flight anything under 300 m.p.h. seemed slow. It was once said that motorists could not stand 60 m.p.h. He thought that Schneider machines pointed the way to higher speeds in commercial flying.



Flying Boat Lands in Snow

A SHORT time ago it became necessary to send a Dornier flying boat from Friedrichshafen to Munich, and as the Munich aerodrome was covered in snow it was decided to try the experiment of landing the machine on the snow. The boat, *Dornier Wal D.1422*, was piloted by Herr Wagner, the Dornier test pilot, and the landing was completely successful. No special preparations had been made at Munich beyond marking out a line with black paper streamers on sticks. These proved effective in

enabling the pilot to judge his height in spite of the fact that the landing was made against the sun. So smooth was the landing that the engineer, who was inside the hull, was unaware of the exact moment of contact. As the machine taxied in a large curve to come to a standstill by the hangar it was not possible to measure the distance to pull up. The relatively flat bottom of the *Wal* and the wing stumps on the hull render this machine particularly suited to alight on snow or ice. Doubtless it could take off from snow just as readily once it had been broken loose.

THE INDUSTRY

AERIAL PHOTOGRAPHY

AEROFILMS, LTD., who have recently transferred their business to Bush House, Kingsway, London, W.C.2, have specialised in aerial photography for many years, and during this time have accumulated a unique collection of some 50,000 views of all subjects taken all over the country. These are stored in new offices at Bush House in the form of a library where any particular plate can immediately be produced.

The uses to which aerial photographs can be put are many and varied; for example, there is a book produced by George Philip & Son, Ltd., which is a collection calculated to assist greatly in teaching children geography. It includes such varied features as town settlements, industrial areas, docks, and factories, thus showing in a manner easily assimilated by the younger generation the chief topographical features of different parts of our country.

For survey work, aerial photography makes its appeal to every conceivable kind of engineering and constructional contract. This will include road construction, way-leads for power lines, drainage and sewerage schemes, town-planning schemes, railway construction, traffic congestion and control, dock and water port plans, estate development, and, in fact, everything wherein maps are required. Thus Aerofilms undertake surveys for many people dealing in such undertakings, for whom they compile either mosaic maps built up from a series of vertical views, in which case these are produced in the usual standard scales, or as a series of oblique views which are an effective means of illustrating the existing conditions over a large area of ground. In this connection it is not too much to say that every town surveyor who wishes thoroughly to understand the problems raised by his work should undoubtedly make use of an aerial survey of his territory. Archaeological surveys are yet another application and an extremely interesting one at that, of aerial photography. The ease with which the outlines of, for example, ancient Roman structures may be seen from the air cannot be realised until this method of investigation has been tried.

For purely industrial purposes Aerofilms supply aerial photographs which may be used as pictorial envelopes, letter headings, posters and striking advertisements, as well as for every other purpose where distinctive effects are desired.

It is not possible in the scope of a short article like this to enter into the methods whereby maps are made from such aerial photographs, but very roughly it may be said that the area to be mapped is covered by photographs taken from a pre-determined height and in such a manner that each photograph overlaps its neighbour by a considerable amount in order that the joining-up process may be done with great accuracy. This, when com-

plete, then produces the original mosaic map. A step further is to transfer all the details thus disclosed to a map drawn in the usual way.

Yet another activity of this firm which is quite apart from aerial photography, is the production of distinctive folders for new novels and covers for industrial publication. These are photographically produced in the Aerofilms' studio and many striking effects are obtained.

THE MAKING OF PLYWOOD

THE STANDARD of plywood manufactured in this country for aviation purposes is so much higher than the standard pertaining abroad that the foreign output of, for example, the Aeronautical & Panel Plywood Co., Ltd., is considerable. They supply plywood to Australia, South Africa, Canada, Italy, Greece, Belgium, the Argentine, Norway, Germany and Turkey, while they have their own factory in Spain.

Naturally, the demand is greatest from those countries which still manufacture their aircraft with wood. In our own country these manufacturers of plywood supply, we believe, about 80 per cent. or more of the plywood used in aircraft.

The company's output is not, of course, confined to the aircraft world entirely. During a recent visit to their works in Kingsland Road, London, we were shown some very fine, solid panels with plywood veneers intended for the new Bank of England.

For aircraft the plywood produced is "Mallite," which is waterproof and mostly of Canadian birch, so that the finished material is 100 per cent. British. The wood arrives from Canada in logs, is stripped and cut to size, and is supplied to the plywood manufacturers in this form.

All the plies must have approxi-

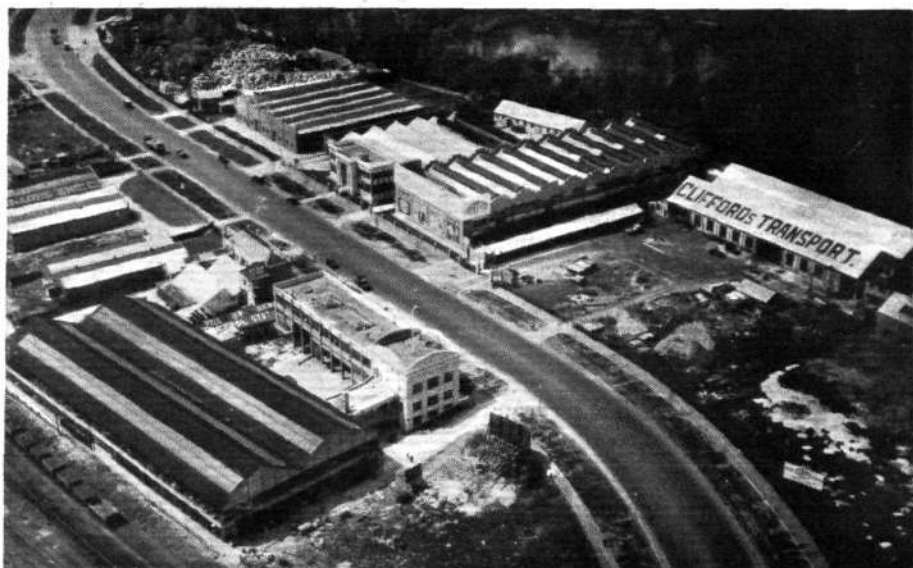
mately the same moisture content before assembly, in order to prevent unequal shrinkage in drying. To ensure an even content of moisture, the sheets are first placed between the warm plates of a steam-heated machine, which is almost human in its selective power of drawing out excessive moisture in one sheet and placing it on an equal with the others. This machine also takes out any buckling, leaving the sheets flat. The process of then making up the plywood is as follows.

Glueing, Pressing and Drying

The plies are run through a glueing machine, which consists of two large rollers dripping with glue, and are then placed together and put into a cold hydraulic press. Next they are submitted to further compression in a massive hot hydraulic press, and the heat produces a certain chemical action on the glued plies, which contributes to the ultimate waterproofness of the plywood.

From the polite but negative answer that we received to the repeated question as to the precise chemical effect of the heated pressure, we gathered that therein is contained a "secret of the trade," or perhaps a secret of this particular manufacturer. The pressure employed in the hydraulic presses, of which there are several, is from half-a-ton per sq. in. upwards.

After this process comes drying in kilns. The best results by kiln drying are obtained with a temperature of 80 deg. F. (27 deg. C.) to 110 deg. F. (43 deg. C.), and a relative humidity ranging from 40 to 60 per cent., depending upon the thickness of the plywood and the number of plies. The moisture content of the conditioned plywood must be not greater than 18 per cent. and not less than 8 per cent. when calculated on the oven dry weight. If the plywood has to have a polished finish, the veneers are placed in drum-sanding machines, which can treat them swiftly with the desired degree of light sanding. There is also a shaving machine which will shave a surface to a very fine degree.



An aerial view taken by Aerofilms, Ltd., of the Great West Road. It shows how industries congregate on our arterial roads. In the left foreground are the works of Telcalemit, Ltd., whose oil cleaner was described in "Flight," for January 15.

One of the virtues of plywood is that it remains suitable for practical purposes when made to an extremely small thickness. We were shown sheets of three-ply only 0.8 mm. thick, and reference was made to sheets only 0.5 mm. thick. It is stipulated that the two outer plies shall be of the same thickness, and the thickness of the core at least equal to that of one of the outer plies, but not exceeding the combined thickness of the two outer plies. The grain of the outer plies must run parallel to the length of the board and that of the core at right angles.

Testing the Plywood

From each batch of boards manufactured with the same mixing of glue one is selected for a test of its strength of adhesion and resistance to water. Test samples 12 in. square are taken, and three pieces are cut, each 6 in. long by 1 in. wide. In each, two saw cuts are made through only two of the three plies, about 1 in. apart. One cut is made from one side of the ply, and the other from the opposite side. The sample piece is then placed in the testing machine and the load applied at the increasing rate of 300 lb. per min. This test forcibly separates the layers. The fractured surfaces must show some adherent fibres distributed more or less uniformly. It is specified that the minimum adhesive strength of the glue must be not less than 200 lb.

The waterproof test is made by taking a piece 6 in. square and immersing it in boiling water for three hours. It is then allowed to air-dry for one hour at normal room temperature. There must be no appreciable signs of separation at the edges of the plies, or formation of blisters, and the minimum adhesive strength of the glue must be not less than 100 lb. per sq. in.

Not more than 100 boards are made with the same mixing of glue. Besides "Mallite," these manufacturers produce "Balsa" plywood, which consists of the Balsa wood sandwiched between veneers of harder wood, resulting in a material of exceptional lightness and suitable for partitions and cabin linings, one of its advantages for the latter purpose being its sound-proof qualities.

They also produce a panel plywood called "Appco," which is suitable mainly for gliders. "Appco," incidentally, is not a meaningless name. It is a collection of the initials of the Aeronautical & Panel Plywood Co., Ltd.

The factory in the Kingsland Road, E.2, is continually expanding, and two features of its extensive equipment which attract the visitor's attention are the huge ram of the hydraulic plant operating on its vertical shaft all day in a big corner at the rear of the factory, and the suction system which draws all the sawdust away from the many departments and deposits it in sacks.

LUBRICATING OIL TESTS

A VALUABLE little book has recently been written by Mr. J. E. Southcombe, a Director of the

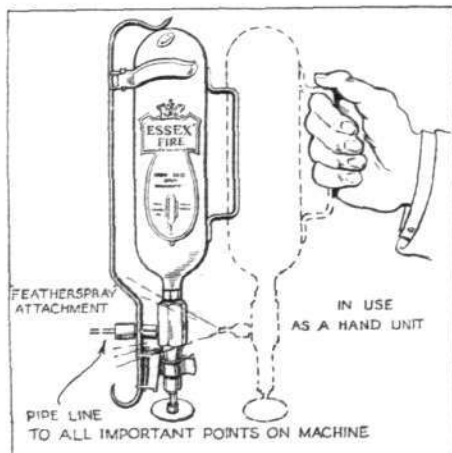


Another Aerofilms photograph showing the enormous assistance which aerial views can give to the Town Planning authorities.

Henry Wells Oil Co., 736, Salisbury House, London, E.C.2, from which firm copies may be obtained at 2s. 6d. net. Although Mr. Southcombe is a Director of this Company his book is not a treatise on his own oils to the exclusion of others. It is one of the few books which deals exclusively with the tests required to ensure that a lubricating oil is of the best quality for each particular purpose. All the ordinary tests are included and fully explained, together with illustrations of the apparatus and instruments. Of particular interest is the apparatus only recently evolved for measuring what has come to be known as the "oiliness" of an oil, that is, the property the oil has for reducing the friction between two surfaces. Some of the tests which many authorities have hitherto accepted as an indication of an oil's quality are now claimed as being no longer satisfactory, and bearing this in mind Mr. Southcombe concludes with some useful data on drawing up an oil specification. At the end of the book there is an excellent list of books suitable for those who wish to go somewhat deeper into the subject than the size the present volume permits.

FIRE EXTINCTION

ESSEX fire extinguishers have been standardised on aircraft used in the R.A.F. for some time, and lately these have been adapted to the "Featherspray" system. By this



"The Essex" Featherspray system.

means pipe lines carry the extinguishing liquid to all vital parts of the aircraft, such as the carburetters, fuel tanks, etc., while at the same time the fire extinguisher may, if required, instantly be detached for use as a single hand-extinguishing unit as hitherto. The extinguishing liquid used is methyl bromide, which is very much more efficient than carbon tetrachloride or other chemicals.

AN AIRSCREW COMPANY CHANGE

THE addition of Dr. Watts to the Board of the Airscrew Co., Ltd., of Weybridge, Surrey, as Technical Director would seem to foreshadow the production of metal airscrews by that Company. Hitherto they have concentrated on the manufacture of wooden airscrews and many of Dr. Watts' designs have been used by the Weybridge factory. British airscrews are accepted as the finest obtainable all over the world, and there is hardly a country from which orders have not been received in steady repetition. Of recent years metal airscrews have been used in increasing numbers, particularly for military aircraft, and it is no doubt in view of this fact that Dr. Watts has been secured by the Airscrew Company. It is understood, however, that he will not entirely sever his connection with Metal Propellers, Ltd., of Croydon, for it is probable that he will continue as consultant for this firm.

GENERAL AIRCRAFT PROGRESS

THE new interesting little Monospar machine which everyone is so eagerly awaiting is now rapidly approaching completion at Croydon and should be flying in about ten days' time. The delays experienced by most people in getting their aircraft parts through "Farnborough" have not proved so serious and everything has now been approved. This first machine is to be retained as a demonstration model, and it is expected that two or three more should be in the air by the time this one has been passed by the A. & A.E.E. at Martlesham Heath.

THE ROYAL AIR FORCE

London Gazette, March 22, 1932.

General Duties Branch

The follg. are granted short service commns., as Pilot Officers on probation with effect from and with seny. of March 11 :—H. R. Allen, W. J. Craig, N. D. Crockart, A. H. Fox, W. M. Keddie, A. W. Langton, G. E. Macdonald, W. McA. McAulay, D. G. Ross, H. M. Russell, J. A. D. Sandeman, P. R. Simpson, W. L. Stedman, E. G. Thompson.

Lt. Cdr. R. A. Peyton R.N., is re-attached to R.A.F. as a Flight Lieut. with effect from March 12, and with seny. of July 1, 1929. The follg. Pilot Officers are promoted to rank of Flying Officer :—W. P. G. Pretty (Jan. 26) ; G. J. S. Chatterton (Feb. 27) ; J. B. S. Monypenny (Feb. 27).

Squadron Leader J. F. Gordon, D.F.C., is placed on half-pay list, Scale A (March 13) ; Flight Lieut. A. W. Symington, M.C., is placed on retired list (March 20). The follg. Flying Officers are transferred to Reserve, Class A (March 19) :—R. David, R. C. Hancock, G. W. Monk, D.F.C. Flying Officer G. N. S. Lane relinquishes his short service commn. on account of ill-health (March 19).

Stores Branch

Flight Lieut. J. R. Brown is placed on half-pay list, Scale B, from Feb. 22 to March 3 inclusive ; Flight Lieut. H. F. Webb is placed on retired list (March 18).

PRINCESS MARY'S ROYAL AIR FORCE NURSING SERVICE

Staff Nurse Miss R. M. Whyte is promoted to rank of Sister (March 9).

ROYAL AIR FORCE RESERVE RESERVE OF AIR FORCE OFFICERS

General Duties Branch

The follg. Flying Officers are transferred from Class A to Class C.—M. G. Bircham (Feb. 17, 1931) ; N. C. Ross-Roberts (March 13).

Flight Lieut. C. A. Elliott is transferred from Class B to Class C (Dec. 12, 1931) ; Flying Officer L. C. Hillman resigns his commn. (Feb. 19) ; Flying Officer K. K. Brown relinquishes his commn. on completion of service (Nov. 13, 1931).

SPECIAL RESERVE

General Duties Branch

Pilot Officer T. N. C. Burrough is promoted to rank of Flying Officer (Nov. 30, 1931).

AUXILIARY AIR FORCE

General Duties Branch

No. 600 (CITY OF LONDON) (BOMBER) SQUADRON.—Pilot Officer G. H. Compton is promoted to rank of Flying Officer (Jan. 26).

ROYAL AIR FORCE INTELLIGENCE

Appointments.—The following appointments in the Royal Air Force are notified :—

General Duties Branch

Wing Commander R. M. Field, to Air Armament School, Eastchurch, 12.3.32, for Administrative duties, vice Sqd. Ldr. C. E. H. C. Macpherson.

Squadron Leaders : G. G. A. Williams, to No. 21 Group H.Q., West Drayton, 11.3.32, for Personnel Staff duties, vice Sqd. Ldr. A. P. Maurice. K. M. St. C. G. Leask, M.C., to No. 60 (B) Sqdn., Kohat, India, 12.2.32, to command, with effect from 20.2.32, vice Sqd. Ldr. H. G. Neville, O.B.E., M.C.

Flight Lieutenants : L. E. Goodman, to R.A.F. Reception Depot, West Drayton, 14.3.32. C. R. Strudwick, to No. 9 (B) Sqdn., Boscombe Down, 7.3.32. F. H. Astle, to Station H.Q., Manston, 14.3.32. H. E. Power, to No. 503 (Co. of Lincs) (B) Sqdn., Waddington, 7.3.32. A. H. Owen, to No. 22 (B) Sqdn., Martlesham Heath, 1.3.32. H. L. Rough, to No. 13 (A.C.) Sqdn., Netheravon, 7.3.32, instead of as previously notified, 3.3.32. S. G. Connolly, to No. 3 Armament Training Camp, Sutton Bridge, 5.3.32. R. A. B.

Stone, to No. 24 (Comms.) Sqdn., Northolt, 9.3.32. A. R. Wardle, A.F.C., to No. 5 (A.C.) Sqdn., Quetta, India, 18.2.32. D. L. G. Bett, to Experimental Section, Royal Aircraft Estab., S. Farnborough, 16.3.32. J. A. Hawkings, to No. 5 Flying Training Sch., Sealand, 14.3.32. A. E. Taylor, to No. 56 (F) Sqdn., North Weald, 14.3.32. F. Simpson, to Aeroplane and Armament Experimental Estab., Martlesham Heath, 14.3.32.

Flying Officers : E. O. Wanliss, to No. 2 (A.C.) Sqdn., Manston, 3.3.32. A. P. F. M. Berkeley, to R.A.F. Base, Gosport, 16.3.32. E. A. Cooke, to No. 40 (B) Sqdn., Upper Heyford, 4.3.32.

Pilot Officers : H. M. White, to No. 26 (A.C.) Sqdn., Catterick, 8.3.32. The undermentioned Pilot Officers are posted to the R.A.F. Depot, Uxbridge, on 11.3.32, on appointment to short service commns. (on probation) :—H. R. Allen, W. J. Craig, N. D. Crockart, A. H. Fox, W. M. Keddie, A. W. Langton, G. E. Macdonald, W. McA. McAulay, D. G. Ross, H. M. Russell, J. A. D. Sandeman, P. R. Simpson, W. L. Stedman, E. G. Thompson.



A.A.F. RUGBY : LONDON v. SCOTLAND : The Easter week-end witnessed a novel and interesting Rugby match between the Auxiliary Air Force squadrons of the London district and of Scotland. The London team was drawn from No. 600 (City of London), No. 601 (County of London), and No. 604 (County of Middlesex) Bomber Squadrons. The Scottish team was drawn from No. 602 (City of Glasgow) and No. 603 (City of Edinburgh) Bomber Squadrons. The match was played at Hendon and resulted in a draw of 6 points all. In the group above the Scottish A.A.F. team are wearing striped jerseys. The names are :—Back Row : F/O. G. O. St. J. Morris ; P/O. Lord G. N. Douglas-Hamilton ; F/O. Lord M. A. Douglas-Hamilton ; P/O. C. D. Griffiths ; P/O. A. Rintoul ; F/O. J. Cherry ; F/O. A. M. Mitchell ; Flt. Lt. P. G. Stewart. Standing : AC.2 Learmouth ; F/O. A. Wallace ; G/Capt. Rev. A. McHardy, M.C., M.A. (Referee) ; F/O. R. Smallman-Tew ; P/O. D. W. Law ; F/O. L. E. A. Healy ; F/O. I. A. Critchley ; F/O. G. H. Compton ; P/O. Howell ; P/O. R. A. Budd ; L.A.C. Young. Seated : F/O. I. G. Statham ; Sqd. Ldr. Marquess of Douglas and Clydesdale, M.P. ; Flt. Lt. F. J. Fogarty, D.F.C. ; F/O. J. S. Feather ; F/O. N. C. Singer ; Flt. Lt. R. J. Legg ; Flt. Lt. R. Faulds. On Ground : F/O. P. Gifford ; F/O. H. C. Hebard ; Flt. Lt. A. D. Farquhar ; P/O. Viscount Knebworth, M.P. ; P/O. J. H. Hodge ; F/O. A. T. G. Thomas ; P/O. Gatherall.

MODELS

SOCIETY OF MODEL AERONAUTICAL ENGINEERS (S.M.A.E.)

The "Gamage" Cup Competition

THE first competition of the season was held on Wimbledon Common on Saturday, March 19, for the "Gamage" Cup, and compared with the weather we have experienced for this competition for the last year or two the conditions were quite good. Before giving a brief report of this meeting, we must first congratulate Tony Willis on putting up on March 13 the "hand-launched" fuselage record to 540.4 sec., a really fine achievement. To return to the "Gamage" Cup, we were pleased to welcome old friends in Mr. Weston and Mr. C. A. Rippon, and Mr. J. A. Doodson, who came all the way from Manchester. There were also two very old "friends" in the way of models; one of them it is whispered was 20 years old and the other was referred to as a "flying ukelele," but they certainly made the competition for "all types" as it should be.

The Cup was won by Mr. G. F. C. Saunders with a fine flight of 110.2 sec., after which flight, unfortunately, he seriously damaged his model whilst "winding up." Mr. A. T. Willis was second with 103.0 sec. and Mr. Pavely third with 76.0 sec.

The following is a complete list of the results:—

GAMAGE CUP, DURATION, ALL TYPES

Competitor	Club	Type	Flights			Best
			sec.	sec.	sec.	
1st G. F. C. Saunders	T.M.A.C.	H. W. Fus	7-0	110-2	—	110-2
2nd A. T. Willis	T.M.A.C.	H. W. Fus	14-2	7-2	103-0	103-0
3rd D. A. Pavely	S.M.A.E.	Twin Pusher	13-0	68-0	76-0	76-0
A. M. Willis	S.M.A.E.	H. W. Fus	10-0	—	—	10-0
R. A. White	T.M.A.C.	H. W. Fus	40-0	51-6	5-0	51-6
R. N. Bullock	S.M.A.E.	L. W. Fus	11-8	15-0	16-0	16-0
N. Peters	T.M.A.C.	H. W. Fus	60-0	75-2	71-0	75-2
F. M. A. Hughes	T.M.A.C.	H. W. Fus	4-0	22-5	16-0	22-5
F. Bagges	T.M.A.C.	H. W. Fus	4-0	35-0	48-6	48-6
G. Knight	T.M.A.C.	L. W. Fus	45-0	31-0	42-2	45-0
G. Foden	T.M.A.C.	L. W. Fus	10-0	8-0	4-0	10-0
F. A. Whippet	T.M.A.C.	H. W. Fus	12-0	32-0	—	32-0
J. E. Pelly-Fry	S.M.A.E.	L. W. Fus	55-6*	19-2*	39-8*	55-6
B. K. Johnson	S.M.A.E.	Twin Pusher	31-0	25-0	19-4	31-0
J. A. Doodson	S.M.A.E.	H. W. Fus	66-5	48-6	53-0	66-5
C. Pearce	T.M.A.C.	H. W. Fus	45-0	41-2	58-6*	58-6
Capt. C. E. Bow	S.M.A.E.	Fuselage Biplane	41-2*	51-0*	45-0	51-0

* R.O.G.

KITE AND MODEL AEROPLANE ASSOCIATION CUP (Flight Golf Competition).—The next competition will be held on Wimbledon Common on Saturday, April 9, for the K. & M.A.A. Cup; the rules are as follow:—

1. The competition to be an open one. Entrance fee for non-members 2s. 6d., affiliated clubmembers 1s., juniors 6d.
2. The competition to be for fuselage models which must comply with the S.M.A.E. formula.
3. The flights to be made hand-launched round a triangular course, each side approximately 300 yd.
4. On having passed the leg of the course the competitors must commence where the model last landed.
5. Any type of power plant may be used.
6. The winner to be the competitor who completes the circuit in the least number of flights.

Prizes.—1st, winner to hold Cup for a year and silver medal (or goods to the value of 10s.); 2nd, bronze medal (or goods to the value of 5s.); 3rd, diploma.

S. G. Mullins, Hon. Sec., S.M.A.E., 72, Westminster Avenue, Thornton Heath, Surrey.

C.M. Aircraft & Model Engineering Club

THE C.M. Aircraft & Model Engineering Club are arranging to meet and give displays on the Riddlesdowns, Kenley, every Saturday. Further particulars may be obtained from A. E. White, 25, Godstone Road, Kenley, Surrey.

PUBLICATIONS RECEIVED

Aeronautical Research Committee Reports and Memoranda: No. 1,411 (Ae. 532-T. 3,020), *Effect of Lateral Stabilisers on Take-off of a Flying Boat.* By L. P. Coombes and R. H. Read. October, 1930. Price 6d. net. No. 1,412 (Ae. 533-T. 3,092), *Theoretical Investigation of the Take-off Time of "Singapore II."* By W. G. A. Perring. February, 1931. Price 9d. net. No. 1,415 (Ae. 536-S. & C. 396), *Moments of Inertia of Aeroplanes.* By S. B. Gates. March, 1931. Price 9d. net. No. 1,416 (Ae. 537-S. & C. 401), *Effect of Centrifugal Force on the Control in a Spin.* By S. B. Gates. May, 1931. Price 3d. net. No. 1,428 (T. 3,154), *Discrepancies in Performances of Aircraft of Same Type.* By W. G. Jennings. August, 1931. Price 6d. net.

Gibbons' Air Stamp Catalogue. 2nd Edition. Stanley Gibbons, Ltd., 391, Strand, London, W.C.2. Price 2s. 6d. net.

Conditions and Prospects of United Kingdom Trade in India, 1930-31. Report by T. M. Ainscough, C.B.E. Dept. of Overseas Trade, No. 503. London: H.M. Stationery Office, W.C.2. Price 3s. 6d. net.

Aeronautical Research Committee Reports and Memoranda: No. 1,380 (Ae. 505-T. 3,044, 2,925), *Pressure and Force Measurements on Airscrew-Body Combinations.* By H. Bateman and F. C. Johansen. December, 1930. Price 3s. net. No. 1,402 (Ae. 523-T. 3,158), *Growth of Circulation about a Wing and an Apparatus for Measuring Fluid Motion.* By P. B. Walker. January, 1931. Price 4s. 6d. net. No. 1,424 (M. 74-I.C.E. 792), *Adhesion and Fatigue of Thin Coatings of White Metal Deposited on Mild Steel Surfaces.* By T. E. Stanton. December, 1930. Price 6d. net. London: H.M. Stationery Office, London, W.C.2.

De Militaire Spectator (Centenary Number), January, 1932. Moorman's Periodieke Pers, The Hague, Holland.

British Aviation Illustrated. By C. A. Sims. London: A. & C. Black, Ltd. Price 3s. 6d. net.

Squadron of Death. By Dick Grace. London: Constable & Co., Ltd. Price 3s. 6d.

Metal Aircraft Construction. By M. Langley. London and Aldershot: Gale & Polden, Ltd. Price 15s. net.

NEW COMPANY REGISTERED

AIR TRAVEL, LTD.—Capital £500, in £1 shares. Transporters by air of passengers and goods of all kinds, aerial photographers, surveyors and advertisers, etc. F. J. V. Holmes, Air Port of Manchester, Patricroft, Lancs., Aeronautical Engineer, is governing director and chairman.

AERONAUTICAL PATENT SPECIFICATIONS

(Abbreviations: Cyl. = cylinder; i.c. = internal combustion; m. = motors. The numbers in brackets are those under which the Specification will be printed and abridged, etc.)

APPLIED FOR IN 1930

Published March 31, 1932

- 35,757. N. MINORSKY. Stabilising-Apparatus. (368,281.)
36,166. E. G. BUDD MANUFACTURING CO. Trusses for use in aircraft structures. (368,367.)

APPLIED FOR IN 1931

Published March 31, 1932

- 4,051. J. MARTIN. Wind-direction indicator. (368,487.)
11,215. P. SCHMIDT. Method of producing motive forces for the propulsion of aircraft. (368,564.)
32,414. H. JUNKERS. Apparatus for riveting tubes. (368,676.)

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